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EARTH OBSERVING SYSTEM
DATA AND INFORMATION SYSTEM (EOSDIS)
TEST SYSTEM (ETS)
HIGH-RATE SYSTEM (HRS)
USER'S GUIDE

VOLUME 1

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National Aeronautics and Space

Goddard Space Flight Center

PREFACE

This document provides the procedures used to operate and maintain the ETS HRS.

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GENERAL INFORMATION

1.1 INTRODUCTION

This document provides the procedures used to operate and maintain the ETS HRS. Development of the system is a joint effort between NASA/Goddard Space Flight Center (GSFC) Codes 521 and 522. Code 521, the Microelectronic Systems Branch, designed the custom hardware and software for the system; Code 522, the Software and Automation System Branch, designed and developed the Telemetry Processing Control Environment (TPCE), which is the operator interface software that provides tools for controlling and monitoring operation of the ETS HRS. (TPCE is fully documented in the ETS HRS User's Guide listed in Section 5, Reference Documentation.)

The ETS HRS may also be controlled and monitored via the Code 521-developed Operations Manager (OPMAN) program. This user interface software runs on a VT-100 (or equivalent) terminal, and can be used to access system information in the event of a network failure. This document provides procedures and information specific to the OPMAN interface; refer to Section 3, Operations.

1.2 SCOPE

The intent of this document is to provide the system user with all information necessary for installing, setting up, and operating the ETS HRS system. The document is divided into five sections. The first section provides an overview of the ETS HRS system. It provides a high-level description of hardware elements, the software environment, and system data flows. The second section provides installation procedures. It also contains a section describing the controls, indicators, and front-panel connectors for all hardware elements. The third section addresses system operation issues. This section includes a description of system commands, procedures for setting up system data flows, and a description of status fields that appear on the various subsystems on the operator interface. The fourth section provides information on system maintenance. The fifth section provides a list of reference documents that support various aspects of the ETS HRS.

The final section of the document contains supporting information. A list of acronym and abbreviation definitions referenced throughout the document is provided. Several appendices offer basic software configuration instructions for various subsystems. The configuration issues addressed here are those related to the more fundamental system data flows. Reconfiguration at this level takes place in subsystem start-up scripts. The types of things configurable from start-up scripts are unlikely to change very much over the course of time. Nevertheless, instructions are provided in the event that fundamental data flow reconfiguration becomes necessary.

1.3 SYSTEM OVERVIEW

1.3.1 PURPOSE OF ETS HRS

The ETS High Rate System (HRS) consists of the VME High-rate Subsystem (VHS), the Tape Recording Subsystem (TRS) and the Control and Display Subsystem (CDS). Together, these three subsystems will support tests for EOSDIS return link science data processing functions. In specific, the VHS will provide the following major functions:

- Transmit two channels of simulated TGT return link data and clock using ETS generated and/or user provided test data at user-selectable rates up to 150 Mbps each.
- Transmit data sets to an external destination through EBnet interface at rates up to 34 Mbps.

- Receive data sets from an external source through EBnet interface at rates up to 34 Mbps.
- Accept SCITF generated spacecraft test data on AMPEX tape media.
- Process SCITF generated spacecraft test data to generate EDOS-compatible Expedited Data Set (EDS) and Production Data Set (PDS).

Despite its specific design, the system includes many additional capabilities. Figure 1-1 illustrates an example operational configuration for ETS HRS.

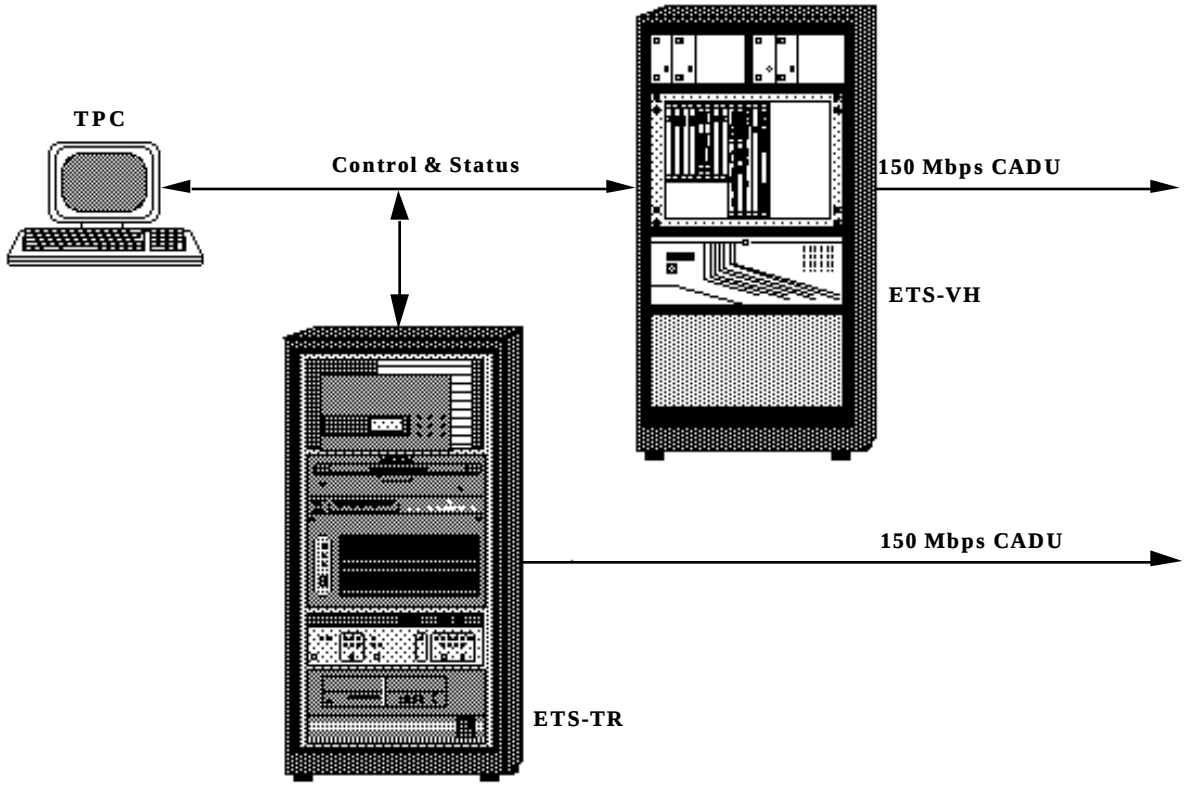


Figure 1-1. ETS HRS Configuration Overview

1.3.2 HARDWARE OVERVIEW

Figure 1-2 illustrates the ETS VHS and ETS TRS racks. Table 1-1 defines system components from left to right for the ETS VHS and top to bottom for the ETS TRS.

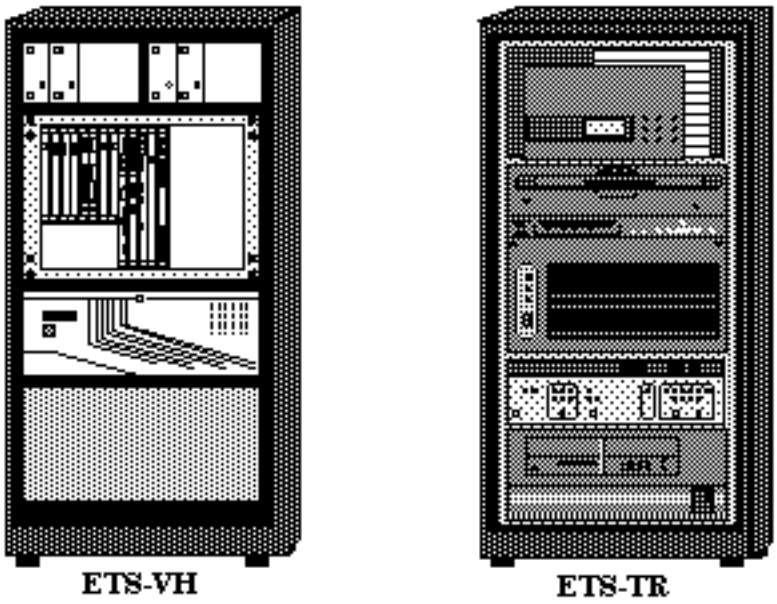


Figure 1-2. ETS HRS Racks

Table 1-1. ETS HRS Racks Assembly Index

Assembly	Type	Part Number	Manufacturer
ETS VHS			
Master Controller	6U	MVME-167-032A	Motorola
SRAM Card	6U - 16 MB	MM6740CN	Micro Memory
SRAM Card	6U - 16 MB	MM6740CN	Micro Memory
SRAM Card	6U - 16 MB	MM6740CN	Micro Memory
Data Set Processor 2	6U	Nitro60	
Data Set Processor 1	6U	MVME-167-032A	Motorola
FDDI Interface Card	6U	5211	Interphase
Annotation Processor	6U	MVME-167-034B	Motorola
FDDI Interface Card	6U	5211	Interphase
Time Code Processor Card	6U	bc336VME	Datum
EOS Frame Synchronizer Card	9U	G1527415	Code 521/GSFC
EOS Reed-Solomon Card	9U	G1527413A	Code 521/GSFC
EOS Service Processor Card	9U	G1527421	Code 521/GSFC
DRAM Card	9U - 512 MB	MM6390D	Micro Memory
EOS Simulator Card, Revision A	9U	G1527414A	Code 521/GSFC
Annotation Disc	Rack mnt.-4GB	RMD-H-4000S	Seagate
Annotation (Back-up) Disc	Rack mnt.-4GB	RMD-H-4000S	Seagate
System Disc	Rack mnt.-4GB	RMD-H-4000S	Seagate
Simulated Data Disc	Rack mnt.-4GB	RMD-H-4000S	Seagate
Time Code Generator	Rack mnt.	9100	Datum
Disk Array	Rack mnt.32GB	6700 Series	CIPRICO
ETS TRS			
Tape Drive	Rack mnt.	DCRsi 107	Ampex
Tape Drive	Rack mnt.	DIR-1000	SONY
Clock (Pulse) Generator	Rack mnt.	HP8130A	Hewlett-Packard
Interface & Control System	Rack mnt.	TSC/STX	Triplex

1.3.3 SOFTWARE OVERVIEW

ETS HRS requires some hardware interaction because the Light-emitting Diodes (LED) of each component report that component's health and processing status. However, the operator primarily interfaces with the system's software. Specifically, the operator uses either the local interface, OPMAN, or TPCE software to control and monitor the system.

Numerous software programs run transparent to the operator, which are used to control and monitor the system at the component level. Also transparent to the operator, OPMAN allows the user to direct these tasks; during data processing, it reports status on component operations, usually in the form of data accounting statistics.

In the case of the ETS VHS, the operator can plug the terminal into an individual component (if a component has a terminal connection, it is easily visible on its front panel), and access status information provided by the software of that card. Multiple terminals can be plugged into the ETS VHS, which allows the operator to monitor the status reports of each card while still using the OPMAN or TPCE interface.

In addition, TPCE software interfaces with the ETS HRS chassis via Ethernet ports 3000, 3100 and 3200. TPCE is a Code 522-designed operator's interface that runs on a HP workstation using Windows; refer to the Code 522 ETS HRS User's Guide listed in Section 6, Reference Documentation, for complete information on this interface.

The ETS HRS software runs in the VxWorks operating environment; therefore, any time a system prompt and blinking cursor appears on a console screen, VxWorks commands are applicable. The operator should rarely (or never) need to use VxWorks; however, it is still important to be aware of some of its available capabilities.

1.3.4 SYSTEM SIGNAL FLOW

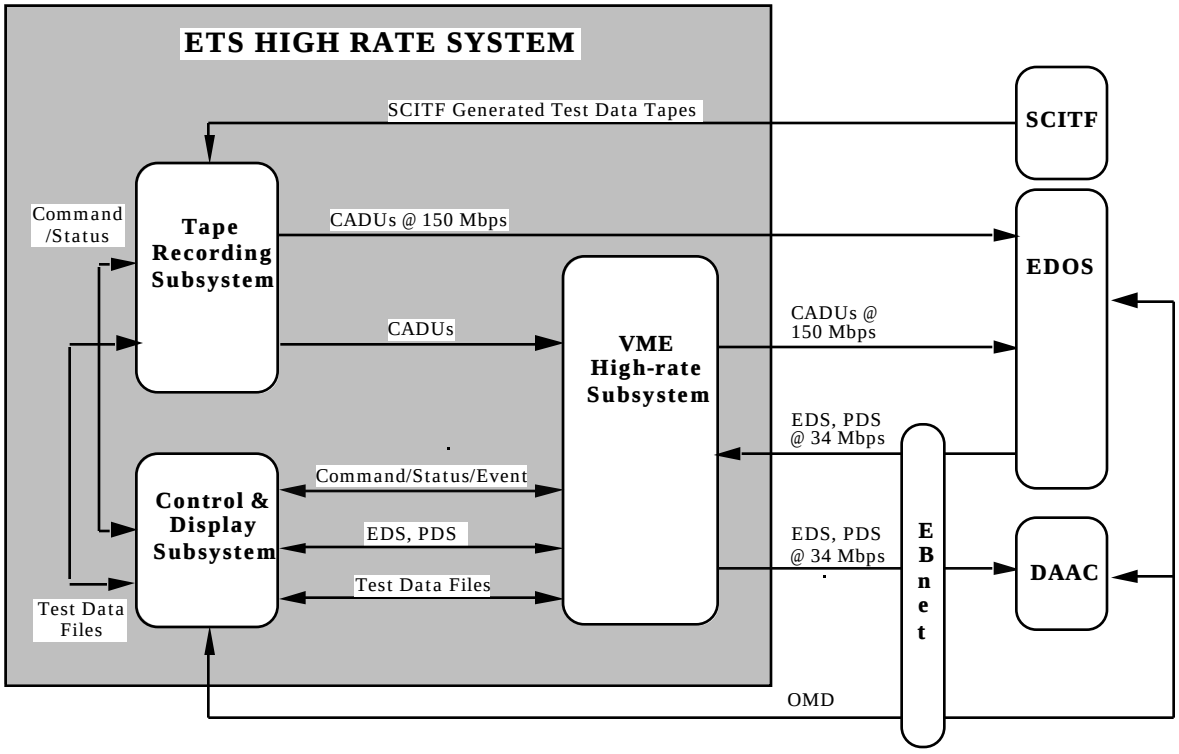


Figure 1-3. ETS HRS Data Flow Diagram

SECTION 2
INSTALLATION

2.1 INTRODUCTION

This section provides information on ETS HRS installation.

2.1.1 INSTALLATION REQUIREMENTS

a. Plug workstation and rack into a Uninterruptable Power Supply (UPS).

b. Access four external Ethernet taps off EBnet, one for the VHS, two for the workstation and one for the TRS.

c. Access one external FDDI tap off EBnet for the VHS.

d. Plug local control terminal into a power source.

2.1.2 INSTALLATION PROCEDURES

a. Verify that the system Internet Protocol (IP) addresses are correct. If the system is not on a local network, check with the System Administrator to ensure that the addresses are acceptable.

b. Connect all power.

c. Connect external Ethernet ports to the VHS, TRS and the workstation.

d. Connect internal Ethernet ports to the VHS and the workstation.

e. Connect external FDDI port to the VHS.

f. Connect internal FDDI port to the VHS and workstation.

g. To use OPMAN, connect a VT-100 terminal to the Master Controller Card (MCC) Input/Output (I/O) interface panel.

h. Bring up the TPCE workstation.

i. Verify that the hard disks are turned on.

j. Turn on power to the chassis.

k. Verify boot process on local (MCC) terminal.

2.2 CABLE CONNECTIONS

2.2.1 INTRODUCTION

This section overviews the external cable connections that must be in place in order for the system to receive input and provide output.

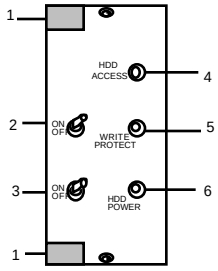
The system is delivered installed in two racks. For the current ETS HRS configuration, the front-panel connections that exist are the VHS-EOS Simulator Card OUTPUT, the VHS-FDDI OUTPUT & INPUT, and the TRS-Triplex OUTPUT.

All Ethernet interfaces shall be at the rear panel of the HRS racks. If the Ethernet connection is not made, no data can be transferred to between the VME rack, TRS and the CDS workstation or a remote workstation. The FDDI connections to the VHS are from the front panel of the VHS rack.

2.3 CONTROLS, INDICATORS, AND FRONT-PANEL CONNECTORS

2.3.1 HARD DISK DRIVES

Controls and indicators for the Hard Disk Drives are defined as follows:



1. Ejector Handle: ejects disk from rack-mounted disk drive chassis. Pull up on top handle while simultaneously pushing down on bottom handle.
2. WRITE PROTECT DISK Switch: When On, prevents disk from being written to; illuminates WRITE PROTECT LED (5).
3. Power Switch ON/OFF: applies power to disk drive.
4. HDD ACCESS LED: lights when hard disk drive is accessed.
5. WRITE PROTECT LED: lights when switch (2) is On.
6. HDD POWER LED: lights when power switch (3) is On.

2.3.2 MASTER CONTROLLER SUBSYSTEM

LEDs for the Master Controller Subsystem (MVME167-32A) are defined as follows:

a. FAIL LED (red): lights when a failure in the board is detected.

b. STAT LED (yellow): status LED. The card decodes MC68040 status lines to drive this LED. A halt condition from the processor causes the LED to light.

c. RUN LED (green): when lit, indicates a local bus cycle is being executed.

d. SCON LED (green): when lit, indicates card is VMEbus system controller.

e. LAN LED (green): when lit, indicates Local Area Network (LAN) chip is local bus master.

f. +12 LED (green): lights when power is available to transceiver interface.

g. SCSI LED (green): lights when card is SCSI bus master.

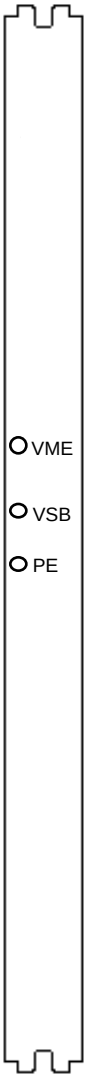
h. VME LED (green): lights when card is using VMEbus, or when it is being accessed by VMEbus.

i. ABORT Switch: not used by ETS HRS. If enabled by software, generates an interrupt at a user-programmable level that is normally used to abort program execution and return to the debugger.

j. RESET Switch: resets entire ETS HRS.

2.3.3 GLOBAL MEMORY

LEDs for Global Memory (MM6390) are defined as follows:



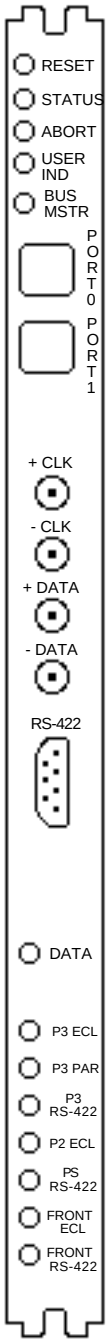
a. VME ACCESS LED (green): lights when card is accessed.

b. VSB ACCESS LED (green): lights when card is accessed.

c. PARITY LED (red): lights if parity error occurs during a read access.

2.3.4 SIMULATOR CARD

Controls and indicators for the custom Simulator Card are defined as follows:



a. RESET Switch: used to reset MZ 8130 and CPU.

b. STATUS LED (red): brightly lit when CPU is halted; dimly lit during normal CPU operation.

c. ABORT Switch: sends an autovectored, nonmaskable level 7 interrupt to the CPU.

d. USER LED (yellow): in normal operation, blinks On/Off at a 1-second rate to indicate that BaSE is functioning.

e. BUS MASTER LED (green): lights when MZ 8130 is VMEbus master.

f. PORT 0: RJ11 connector for serial port 0; primary serial RS-232 port.

g. PORT 1: RJ11 connector for serial port 1; alternate serial RS-232 port.

h. +CLK Connector: if card is set up to output Emitter Coupled Logic (ECL) test data via the front panel, this connector supplies ECL +clk.

i. -CLK Connector: if card is set up to output ECL test data via the front panel, this connector supplies ECL -clk.

j. +DATA Connector: if card is set up to output ECL test data via the front panel, this connector supplies ECL +data.

k. +DATA Connector: if card is set up to output ECL test data via the front panel, this connector supplies ECL -data.

l. RS-422 Connector: if card is set up to output TTL test data via the front panel, this connector supplies RS-422 test data output.

m. DATA LED (green): when lit, indicates data is being output to whichever output ports are enabled.

n. P3 ECL LED (yellow): when lit, indicates P3 pipeline ECL test data output port is enabled.

o. P3 PAR LED (yellow): when lit, indicates parallel test data output port is enabled.

p. P3 RS-422 (yellow): when lit, indicates P3 pipeline RS-422 test data output port is enabled.

q. P2 ECL (yellow): when lit, indicates P2 connector ECL test data output port is enabled.

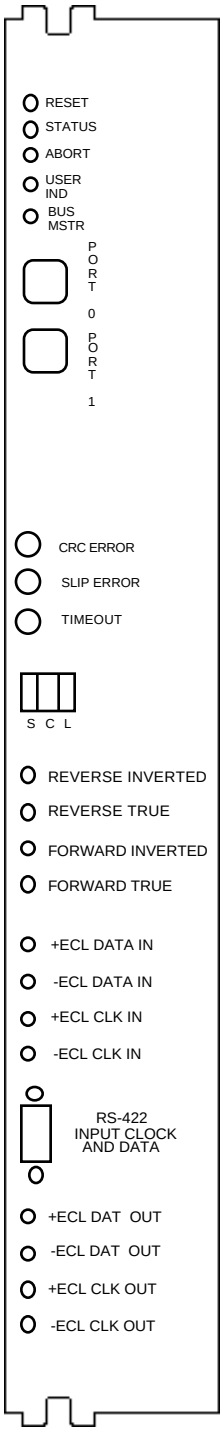
r. P2 RS-422 (yellow): when lit, indicates P2 connector RS-422 test data output port is enabled.

s. FRONT ECL (yellow): when lit, indicates front-panel ECL test data output ports are enabled.

t. FRONT RS-422 (yellow): when lit, indicates front-panel RS-422 test data output port is enabled.

2.3.5 FRAME SYNCHRONIZER CARD

Control and indicators for the custom Frame Synchronizer Card are defined as follows:



a. RESET pushbutton allows the operator to reset the controller and start initialization routines.

b. STATUS LED, controlled by the MC68030 CPU halt signal, indicates the MC68030 halted during a local reset, VMEbus reset, or power-up.

c. ABORT pushbutton generates a level seven interrupt that may be used to abort all tasks on the card.

d. USER IND LED is an operator-defined LED that is illuminated when control register bit 17 is cleared.

e. BUS MSTR LED indicates the controller is presently the VMEbus master.

f. PORT 0 is an RS-232 port that may be connected to a terminal or to a printer.

g. PORT 1 is an RS-232 port that may be connected to a terminal or to a printer.

h. CRC ERROR LED indicates a CRC error has occurred in the frame.

i. SLIP ERROR LED indicates a slip error has occurred in the frame.

j. TIMEOUT LED is user-programmable; it is typically used to indicate the card has timed out.

k. LOCK/CHECK/SEARCH LED indicates current mode.

l. Reverse Inverted, Reverse True, Forward Inverted, and Forward True LEDs indicate the type of data that is being processed.

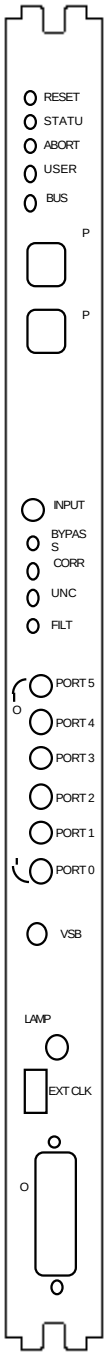
m. DB-9 RS-422 Input Clock and Data front-panel connector accepts input clock and data.

n. +ECL Input Data, -ECL Input Data, +ECL Input Clock, and -ECL Input Clock are the four differential input connectors.

o. +ECL Output Data, -ECL Output Data, +ECL Output Clock, and -ECL Output Clock are the four differential output connectors.

2.3.6 REED-SOLOMON CARD

Control and indicators for the custom Reed-Solomon Card are defined as follows:



a. RESET Pushbutton: MZ 8130/sidecard reset switch.

b. STATUS LED (red): MZ 8130 CPU halt indicator.

c. ABORT Pushbutton: MZ 8130 abort switch.

d. USER IND LED (yellow): VMEbus B CLR indicator.

e. BUS MSTR LED (red): VMEbus master indicator.

f. PORT 0: MZ 8130 serial port 0.

g. PORT 1: MZ 8130 serial port 1.

h. INPUT FRAME LED (green): indicates EOF marker was written to input FIFO.

i. BYPASS MODE LED (amber): indicates card is operating in Bypass Mode; no correction or detection enabled.

k. CORR FRAME LED (red): Indicates correctable, errored frame was output from RSEC Chip. Determined by CS_REJ and CS_STD active.

l. UNC FRAME u: Indicates uncorrectable frame was output from RSEC Chip. Determined by CS_REJ active and CS_STD inactive.

m. FILT FRAME LED (amber): Indicates frame was filtered based on routing information.

n. OUTPUT FRAME-VSB PORTS 5-0 LEDs (green): Indicate frame was written to corresponding ERS Card HRTB port for output.

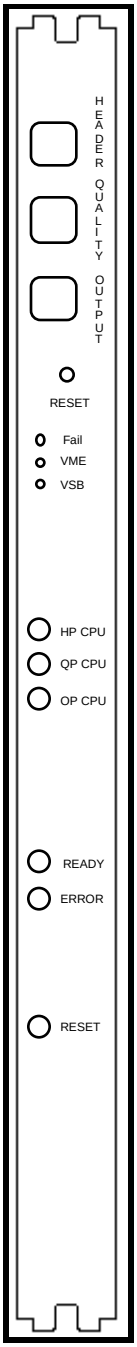
o. LAMP TEST Pushbutton: When pressed, causes all LEDs to illuminate.

p. EXT CLK: Input port for external clock.

q. OUTPUT: RS-422 output port for optional frame output.

2.3.7 SERVICE PROCESSOR CARD

Controls and indicators for the custom Service Processor Card are defined as follows:



a. HEADER is an RS-232 port that connects the Header Processor to a local terminal.

b. QUALITY is an RS-232 port that connects the Quality Processor to a local terminal.

c. OUTPUT is an RS-232 port that connects the Output Processor to a local terminal.

d. RESET pushbutton allows the operator to reset the EOS Service Processor Card and start card initialization routines.

e. FAIL LED (red) lights when a failure condition is detected.

f. VME LED (green) lights when VME bus is accessed by the card.

g. VSB LED (green) lights when VSB bus is accessed by the card.

h. HP CPU LED (green) blinks once every second after the card is booted, which indicates that the Header Processor CPU is alive.

i. QP CPU LED (green) blinks once every second after the card is booted, which indicates that the Quality Processor CPU is alive.

j. OP CPU LED (green) blinks once every second after the card is booted, which indicates that the Output Processor is alive.

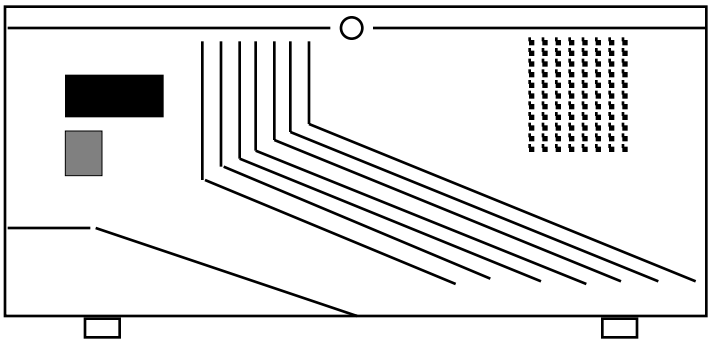
k. READY is a software-controlled LED that indicates the card is ready to process data.

l. ERROR LED (red) is a software-controlled LED that indicates the card is unable to process any data.

m. LAMP TEST is used to test LEDs.

2.3.8 CIPRICO DISK ARRAY:

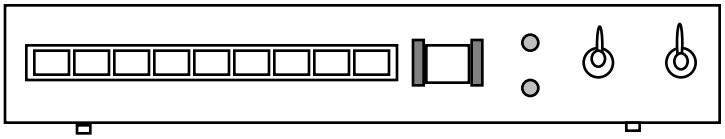
The Ciprico Disk array is accessed and controlled via the ETS VHS. The control and indicator panels are described as follows:



Display: Indicates the state of the Ciprico Disk Array. When the status is OK, it means the system is operational.

2.3.9 TIME CODE GENERATOR:

The Datum Time Code Generator, mounted in the ETS VHS rack, is set-up manually. The control and indicator panels are decribed as follows:



DAYS: Displays the Julian day.

HOURS: Displays the hours elapsed in the Julian day.

MINUTES: Displays the minutes elapsed in the Julian day.

SECONDS: Displays the seconds elapsed in the Julian day.

SET: Tumble switch that sets the time in the generator. This switch changes the unit that is selected by depressing the push button beneath the respective LED display. For example; when the button beneath the most significant unit of the DAYS display is depressed, i.e. the first button from the left, the value rolled on the tumble switch will change the value being displayed for the hundreds of days.

START: This button starts the Datum Time Code Generator to increment time.

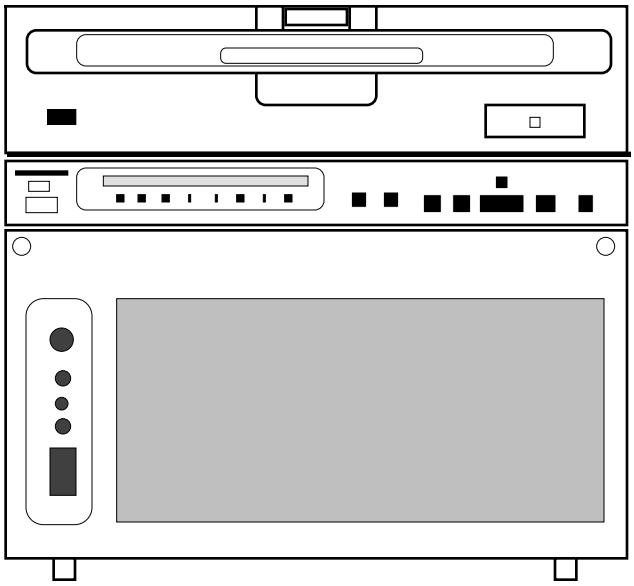
STOP: This button stops the Datum Time Code Generator from incrementing time.

GEN/SYNC GEN: This switch toggles between generating the time code and synchronizing to an external time source.

ON/OFF: This switch toggles the Time Code Generator power on and off.

2.3.10 SONY TAPE DRIVE

The SONY Tape Drive, mounted in the ETS TRS rack, can be accessed manually or via the TRS Graphical User Interface residing on the CDS. In the operational mode the manual functions will NOT be used. The control and indicator panels are described as follows:

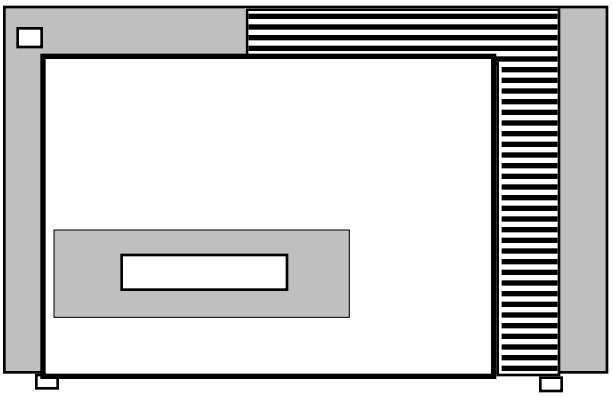


EJECT:	This button ejects the tape (cassette).
TAPE RUNNING:	Indicates whether the tape is running or has stopped.
REMOTE switch:	Switches between remote controlled operation i.e. from the Triplex interface, and non-remote control.
PANEL LOCK switch:	This switch controls the activation of selected front panel keys and buttons; i.e. EJECT, Menu Operation (SHIFT, F1, F2, F3, ↓, ↑, →, HOLD/SET), MARK, PREROLL, Tape Control (REW, FF, STOP, STANDBY, FWD and REC)
Display:	This displays the four menus available to the system Home, Setup, Diag and Test (see Chapter 5 of the DIR 1000 Manual).
Menu operation keys:	Used to adjust parameters (see Chapter 5 of the DIR 1000 Manual)
ALARM indicator:	Lights up when a system fault occurs.
SERVO indicator:	Lights when the tape run and drum rotation reach and maintain the normal speeds
REC INHIBIT lamp:	Lights to indicate that the cassette and/or drive is in the recording inhibition mode.
MARK:	Button used to mark a tape position which can be automatically found later.

PREROLL:	Button used to preroll mark point as a reference.
REW:	Button rewinds the tape to the beginning.
FF:	Button fast forwards the tape rapidly to the end.
STOP:	Button stops the tape transport.
FWD:	Button forwards the tape for normal playback.
REC:	Button when depressed with the FWD button, puts the DIR 1000 in the record mode.
STANDBY:	Button puts the recorder in a standby mode, i.e. the drum is rotating and thus recording can start immediately.
VOLUME knob:	Controls the sound volume on the headphones.
PHONE jack:	Accepts the plug of the headphones (monaural).
PEAK LEVEL indicator:	Indicates the peak level of the microphone sound.
MIC jack:	Accepts the plug of the microphone.
POWER switch:	Turns power of the DIR 1000 recorder on and off.

2.3.11 AMPEX TAPE DRIVE

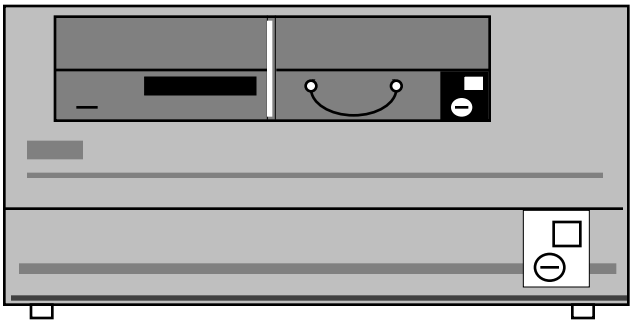
The Ampex Tape Drive, mounted in the ETS TRS rack, will only be accessed via the TRS Graphical User Interface residing on the CDS. The indicator panels are described as follows:



POWER switch:	This switch turns ON and OFF power to the Ampex tape drive. The indicator lights up when the power is on.

2.3.12 TRIPLEX INTERFACE

The Triplex Interface, mounted in the ETS TRS rack, is the control and monitoring function of the TRS. The Triplex will be accessed via the TRS Graphical User Interface residing on the CDS. The control and indicator panels are described as follows:



DC ON/DC OFF: This is a front panel keyed switch in the lower right corner which is a low voltage circuit which the STX's main chassis power supply uses to control the power output (on or off) condition. The switch has three positions. In the center position, the power is on and the reset button (immediately adjacent to the key-switch) is enabled, all other positions of the key switch disable the reset button.

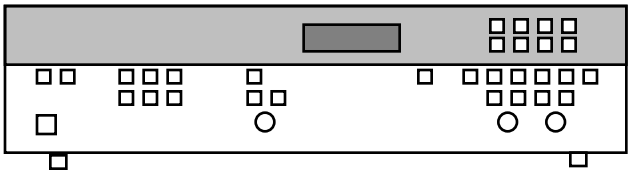
RESET: This is a reset button which causes a reset to occur on the VME bus. This switch only functions when the three position power switch is in the middle position.

Display: The LED display shows the removable Hard Disk Drive's current SCSI Target number. (This value is switch settable on the HDD Frame. In SunOS 4.1.3 systems, the conventional default boot disk is SCSI target number three.) The decimal point on the LED display indicates disk activity on the attached SCSI device.

Key: This key on the removable Hard Disk Drive Frame both locks the HDD in its Carrier into its Frame in the STX, and controls the power to the HDD. If the key is turned to the unlock position while the system is running, power to the HDD will be abruptly disconnected.

2.3.13 CLOCK GENERATOR

The Hewlett-Packard Clock (Pulse) generator, mounted in the ETS TRS rack, may be controlled manually via the front panel switches or via software through the TRS Graphical User Interface residing on the CDS. The control and indicator panels are described as follows:



Display:	The value shown in this LED display is the current value of the parameter that a key access has been permitted. The value can be changed using the VERNIER keys.
PULSE:	One or two pulses are generated for each press of this key when in triggere, gate or burst mode.
ADS:	This LED indicates when the instrument is addressed in the listen or talk mode.
AMPL:	This key programs the amplitude of the output waveform.
AUTO:	This LED indicates that the automatic operating mode has been selected.
BURST:	This LED indicates that the burst operating mode has been selected.
COMP:	This key complements the signals at both the output and output_bar.
COUNT:	This key sets the number of pulses or double pulses contained in the burst operating mode.
DCYC:	This key is used to set the duty cycle, i.e. the percentage on-time of the pulse as a percentage of the period.
DELAY:	This key is used to set the delay between the output of a trigger and the beginning of a pulse.
DISABLE:	This key is used to disable or enable the output (or output_bar).
DOUB:	This key sets the delay of the second pulse with respect to the first pulse. It operates only in the double pulse mode.
ERROR:	Located in the left of the display, this LED lights up when an error condition occurs.
E.WIDTH LED:	This LED lights up when the external width operating mode is active.
EXCESSIVE:	This LED is used to indicate that the timing parameters have been set in such a way that the signal can not reach it's full amplitude.
GATE:	This LED indicates that the gate operating mode has been selected.
HIGH:	This key is used to set the high level of the output signal.
LCL:	This key returns the instrument to the local control mode from the remote control operating mode.
LEAD:	This key is used to set the time taken for the leading edge of the output pulse to reach 90% of the set amplitude from 10% of the set amplitude level.
LIMIT:	This key is used to set the high and low levels for the output and (output_bar) signals.
LOW:	This key is used to set the low level of the output signal.
MAN:	This function simulates an external input signal in the trigger, gate, and burst operating modes.
MEM:	This key is used to access the internal memory as a part of the save or recall operation.
OFFS:	This key is used to set the offset of the output signal.
PERIOD:	This key is used to set the period of the output signals.

POWER-OFF/ON: This key switches the power to the instrument on or off.

RANGE: This function increments or decrements the displayed value. The up arrow increments the value by a factor of 10 and the down arrow decrements the value by a factor of 10.

RCL: This key recalls a saved or pre-programmed setting from a location 0-19 keyed in after the MEM key has been pressed. The standard setting is in location 0.

RMT: This LED indicates that the instrument is enabled for remote control operation.

SAVE: This key stores a programmed setting into internal memory.

SET: This key puts the instrument into the standard setting as defined in the technical manual.

Slope: These two keys, upward ramping and downward ramping, set the slope of the external input signal. on which the trigger is activated.

SRQ: This LED indicates when a service request is pending.

THRE: This key sets the threshold level at which the EXT INPUT signal causes a trigger.

TRA: This key is used to set the time taken for the trailing edge of the output pulse to reach 10% of the set amplitude from 90% of the set amplitude level.

TRIG: This LED indicates that the instrument is operating in the trigger operating mode.

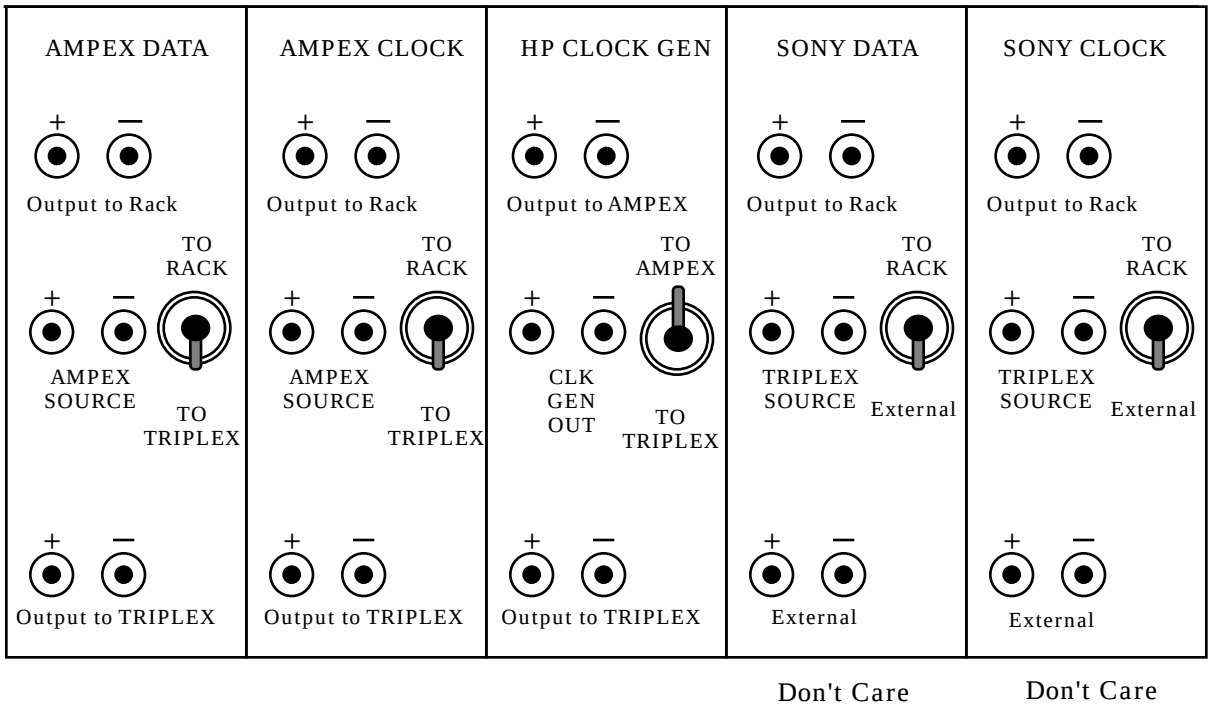
Units: An LED indicates which units are currently active. These units are located to the right of the display.

VERNIER: These keys are used to set the parameter values or change the interface address.

WIDTH: This key is used to set the on-time of the pulse.

2.3.14 ETS TRS SWITCH PANEL

The External Clock Signal is generated from the Clock Signal Generator (CSG). Since the same piece of equipment has to provide the signal to the Ampex during the 'dubbing' mode, and to the SONY tape drive during a TRS playback mode, the ETS TRS Switch Panel is used to direct the signal wherever appropriate. A specific configuration of the ETS TRS switch panel is shown as follows.



For example, when the Ampex data is being dubbed from the Ampex tape drive on to the SONY tape drive, the CSG feeds the clock signal to the Ampex. The Ampex in turns feeds the data and clock in to the Triplex, which is the I/O buffer for the SONY tape drive. The switch panels tagged as don't care reflect the fact that these switch settings are not used for the 'dubbing' mode. The switch panel can be set to implement the following scenarios:

2.3.14.1 'Dubbing' from Ampex

AMPEX DATA: Switch set to TRIPLEX

AMPEX CLOCK: Switch set to TRIPLEX

HP CLOCK GEN: Switch set to AMPEX

SONY DATA: Don't Care

SONY CLOCK: Don't Care

2.3.14.2 Playback from SONY

AMPEX DATA: Don't Care

AMPEX CLOCK: Don't Care

HP CLOCK GEN: Switch set to TRIPLEX

SONY DATA: Switch set to External/Rack

SONY CLOCK: Switch set to External/Rack

This switch panel can also be used in a test environment to self test the system by feeding data back in to the ETS VHS (Rack).

2.3.14.3 Record from CDS to SONY

AMPEX DATA: Don't Care

AMPEX CLOCK: Don't Care

HP CLOCK GEN: Switch set to TRIPLEX

SONY DATA: Don't Care

SONY CLOCK: Don't Care

2.3.14.4 Record from ETS VHS to SONY

AMPEX DATA: Replace with direct cable from Rack Data Output to 'Output to Triplex'

AMPEX CLOCK: Replace with direct cable from Rack Clock Output to 'Output to Triplex'

HP CLOCK GEN: Don't Care

SONY DATA: Don't Care

SONY CLOCK: Don't Care

2.3.14.5 Playback from SONY to CDS

AMPEX DATA: Don't Care

AMPEX CLOCK: Don't Care

HP CLOCK GEN: Switch set to TRIPLEX

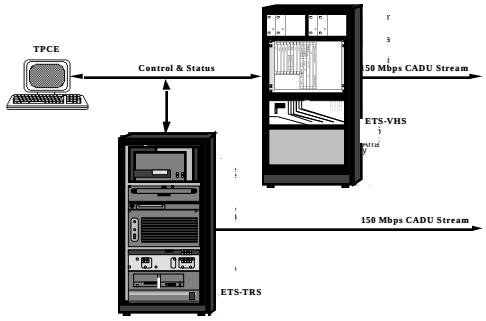
SONY DATA: Don't Care

SONY CLOCK: Don't Care

2.4 MEMORY MAP CONFIGURATION

Subsystem	Memory Allocations
Master Controller (MVME167-32A)	00000000
System Memory (16M) (SRAM1 - MM6740CN)	7D000000 - 7DFFFFFF (VME)
System Memory (16M) (SRAM2 - MM6740CN)	7E000000 - 7EFFFFFF (VME)
System Memory (16M) (SRAM3 - MM6740CN)	7F000000 - 7FFFFFFF (VME)
Global Memory (512M) (DRAM - MM6390D)	80000000 - 9FFFFFFF (VME) 80000000 - 9FFFFFFF (VSB)
Simulator Card (SX1)	D0000000
Frame Synchronizer Card (FS1)	D0800000
Reed-Solomon Card (RS1)	D1000000
Service Processor Card (SV1)	D1800000
Annotation Processor Card (AP1) (MVME167-34B)	10000000
Data Set Processor Card (DSP1) (MVME167-32A)	20000000
Data Set Processor Card (DSP2) (Nitro60)	70000000

SECTION 3
OPERATIONAL SCENARIOS



This section describes the Operational Scenarios in which the ETS HRS system will be used. The section will describe the two modes of operations, namely the ETS Operations Mode and the ETS Off-line Mode. The Off-line Mode is used to create the simulated data and stage it for the Operations Mode.

The active elements in each of the scenarios are listed and the set-up and configuration of these elements are described in Section 4.

3.1 ETS OPERATIONS MODE

The ETS Operations Mode (referred to as the Big Disk mode) is defined as the mode in which the ETS HRS is used to test the interfaces to and from EDOS as described in the ETS HRS System Requirements document. This mode will essentially test the configurations described in the following paragraphs. The procedures for testing these configurations are also outlined in the following paragraphs, and the details on how the each sub-system within these test configurations is set-up are described the later sections of the document.

In the Operations Mode, a limited number of cards or sub-systems that are active on the ETS HRS VME Rack. This ensures the least amount of traffic on the VME back-plane to achieve the high data rets expected of the VME system. The cards that are active in this mode are:

- Master Controller
- Simulator Card
- Data Set Processor Card

These cards are configured using catalogs with the required information. The process of loading a catalog may be accomplished by either using the local control terminal running OPMAN, or by using the CDS running TPCE. The TRS is configured to run controlled by the TRS GUI residing on the CDS.

3.1.1 DATA SETS TRANSFER FROM ETS HRS VIA EBNET

The following sequence of steps will implement the transfer of data sets resident on the Ciprico Disk Array using FTP over the FDDI interface via EBnet to the DAACs. The data sets have to be previously stored on the disk array. The configuration shown in Figure 3-1 shows the active elements in the data set transfer.

1. Ensure the system in the "BIG-DISK" mode.
2. From the UI select the display page for FILE TRANSFER (under OPMAN it is FD Status).
3. In the FILE TRANSFER page, select the file and the destination (under OPMAN select the *Commands* option from the set of options displayed at the bottom of the displayed page).
4. In the FILE TRANSFER page, select the command to SEND the data (under OPMAN, in the commands list, select the *File Transfer* command).

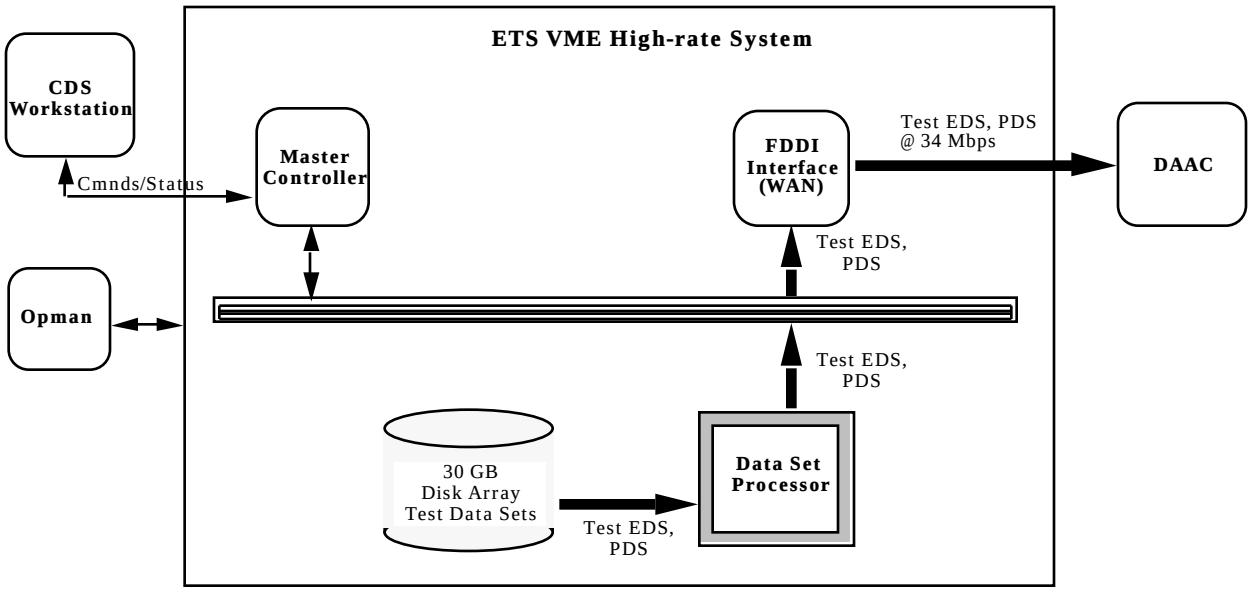


Figure 3-1. ETS HRS Simulating Data Sets Transfer to DAACs

5. (Under OPMAN, from the displayed page select the *Browse* option for the session under review).

6. (Under OPMAN, from the file listing, select the specific file for transfer and enter the destination for the file).

7. (Under OPMAN, for the displayed file select the *Send* option to send the file out on EBnet).

8. Read the status on the FILE TRANSFER status page (under OPMAN monitor the status on the FD Status Page).

3.1.2 DATA SETS RECEIPT ON ETS HRS VIA EBNET

The following sequence of steps will implement the FTP receipt of data sets to the Ciprico Disk Array over the FDDI interface via EBnet from EDOS. The data sets will be stored on the disk array. The configuration shown in Figure 3-2 shows the active elements in the data set receipt.

1. Ensure that the system in the "BIG-DISK" mode.

2. Ensure that the FTP daemon is running on the ETS VHS.

3. From the UI select the display page for FILE TRANSFER (under OPMAN it is FD Status).

NOTE: In the test environment, to test the FDDI interface into the system, the FDDI connector from the CDS is connected to the DSP. A FTP command issued on the CDS UNIX window will transfer a specified file from the CDS local disk to the Ciprico Disk Array.

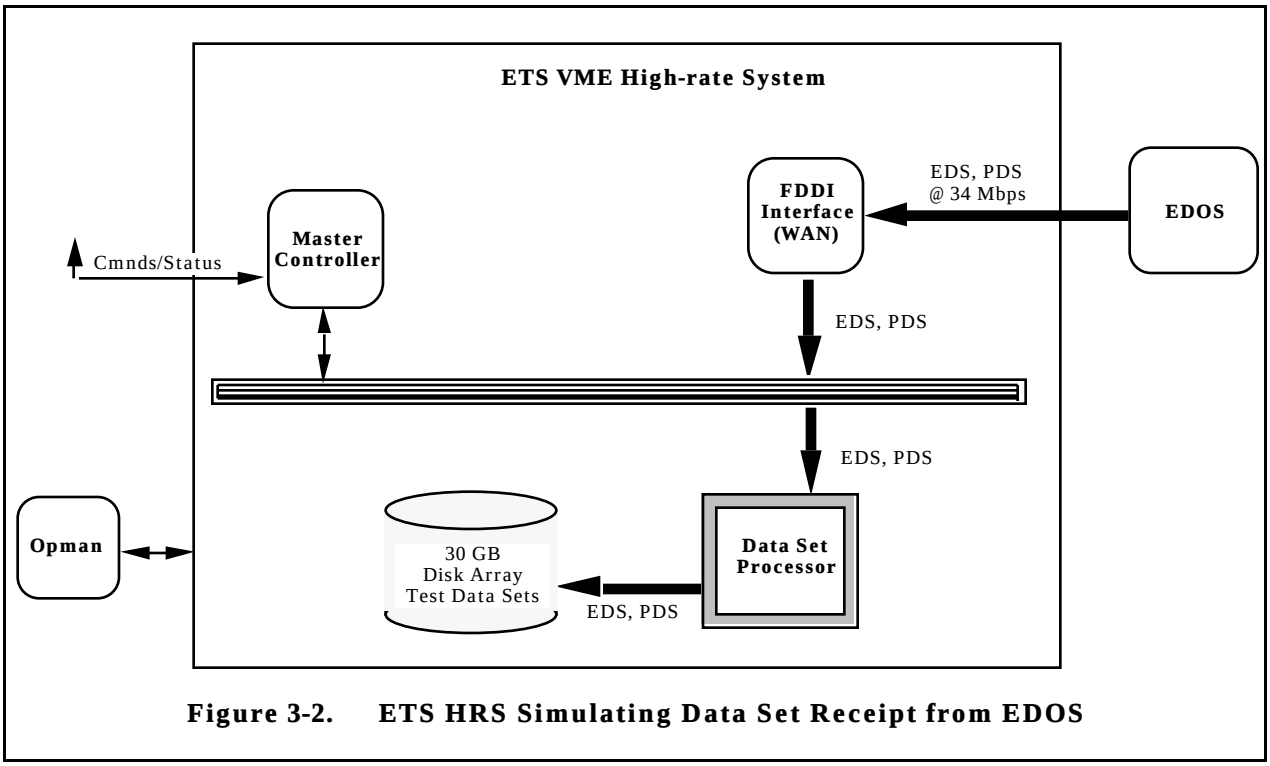


Figure 3-2. ETS HRS Simulating Data Set Receipt from EDOS

3.1.3 RETURN LINK TELEMETRY DATA STREAM FROM ETS HRS TO EDOS

The following sequence of steps will implement the simulated TGT return-link data streams to EDOS. There are two simulated streams that are sent to EDOS. One stream is simulated using the ETS VHS and the other stream is simulated using the ETS TRS. The simulated data, which in this case are CADUs are created using SCTGEN.

3.1.3.1 ETS VHS Simulated Return-Link Data Stream

In this implementation of the return link data stream, the CADU test data is generated by SCTGEN in the form of a 'base' and 'update' file. The 'base' file is loaded on to the Simulator card using a catalog. The update file is previously loaded in to the system disk on the ETS VHS. When the serial data stream is simulated, the CADU data is output via the front ECL data and clock output terminals on the Simulator Card. Figure 3-3 shows the active elements in the ETS VHS simulation of a TGT return link data stream.

1. Ensure that the system in the "BIG-DISK" mode.

2. To set-up, from the UI select the *Load* or *Edit* option.

3. If *Edit* is selected, type in the name of the catalog to be loaded and edited.

4. The opened catalog will display only one set-up page that is editable, i.e. the SX set-up page.

5. After re-editing the catalog, the option to *Save* and/or *Activate* is used to run the catalog.

6. If *Load* is selected, type in the name of the file to be loaded, and *Enable* the catalog.

7. The status of the CADU data transfer is monitored on the SX status page.

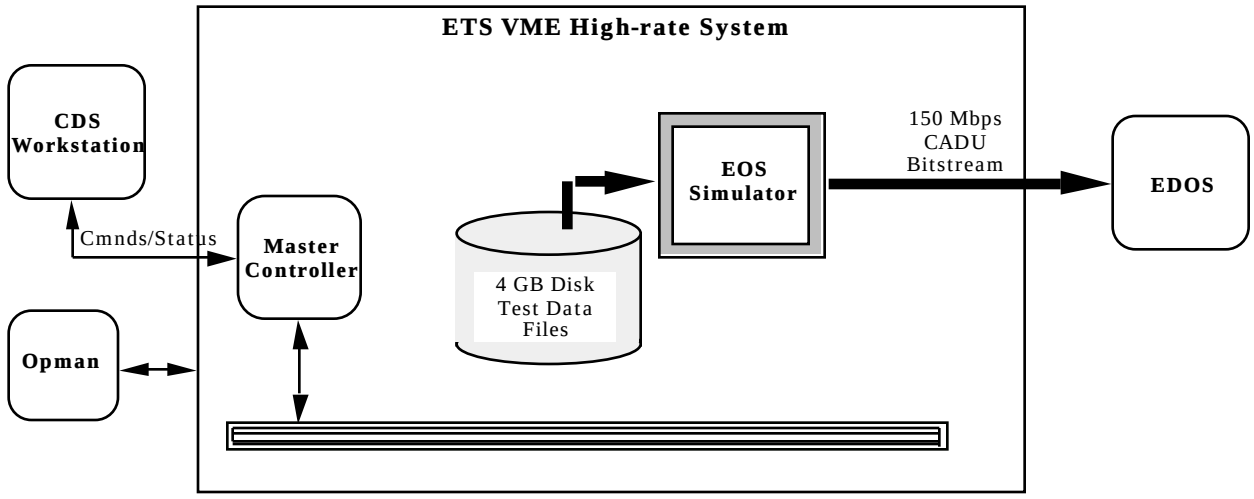


Figure 3-3. ETS VHS Return-Link Simulation

3.1.3.2 ETS TRS Simulated Return-Link Data Stream

In this implementation of the return link data stream, the CADU test data is generated by SCTGEN in the form of a 'plain' file. The plain file is previously recorded on to a SONY tape on the TRS. The ETS TRS GUI is opened from the CDS, and the file name selected form the listed directory on the SONY tape. When the serial data stream is simulated, the CADU data is output via the SONY data and clock output terminals on the Switch Panel on the ETS TRS. Figure 3-4 shows the active elements in the ETS TRS simulation of a TGT return link data stream.

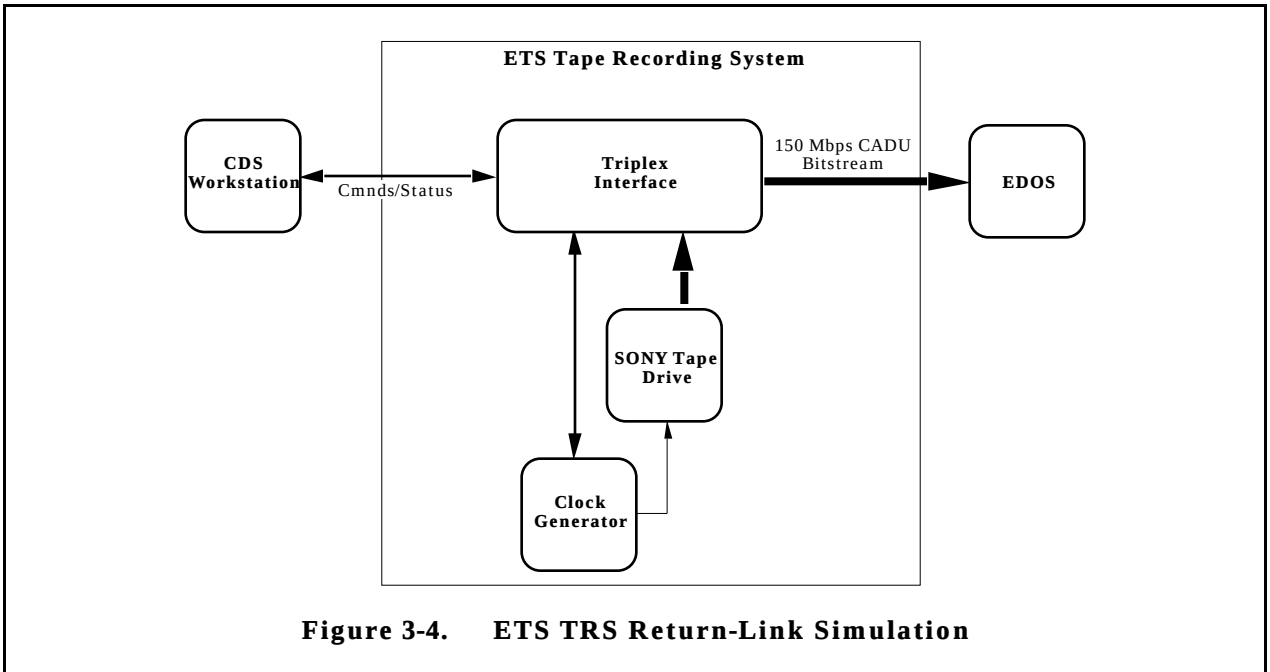


Figure 3-4. ETS TRS Return-Link Simulation

1. Bring up the ETS TRS Graphical User Interface using the UI on the CDS.

2. On the switch panel for the TRS, set the Clock generator to the TRIPLEX mode, the SONY DATA and CLOCK output to the EXT mode.

3. On the Clock Generator control panel, recall a preset value for frequency and ECL levels, or set ECL levels and the frequency for data rate output.

4. Using the PLAYBACK mode for the SONY, select the SONY tape and specific file on the tape to be output and depress the PLAY icon on the GUI.

5. The status of the CADU data transfer is monitored on the ETS TRS GUI display page for the SONY.

3.2 ETS OFF-LINE MODE

This mode is used to generate test data prior to the running of any actual tests. The test data may be return-link data using SCTGEN, data sets using SCTGEN or the ETS VHS. In this mode the ETS VHS will be in what is referred to as the "LZP Mode". In this sub-section the generation of these data products will be discussed.

In the Offline Mode, the whole complement of cards or sub-systems are active on the ETS HRS VME Rack. The cards that are active in this mode are:

- Master Controller
- Simulator Card
- Frame Synchronizer Card
- Reed-Solomon Card
- Service Processor Card
- Annotation Processor Card
- Data Set Processor Card

These cards are configured using catalogs with the required information. The process of loading a catalog may be accomplished by either using the local control terminal running OPMAN, or by using the CDS running TPCE. The TRS is configured to run controlled by the TRS GUI residing on the CDS

3.2.1 GENERATING SIMULATED DATA SETS FOR TRANSFER TO AND FROM EDOS

There are two options to create these data sets. The first option is to use SCTGEN to create the data sets and store them on a tape media. Prior to the test configuration for data set transfer from the ETS HRS to EDOS, these data sets must be transferred from the tape media to the Ciprico Disk Array on the ETS VHS. The second option is to input a known return-link data stream into the VHS and perform level-zero processing on the data. The data sets are then generated by the ETS VHSand stored, once again, on tape media prior to the configuration to be tested. These data sets are transferred to the Ciprico Disk Array on the ETS VHS to run the test.

3.2.1.1 SCTGEN-Created Data Sets:

- Create the data sets using SCTGEN, these data sets will be written on to the default device, the CDS.
- Once a data set file is on the CDS, FTP the data set to the ETS VHS Ciprico.

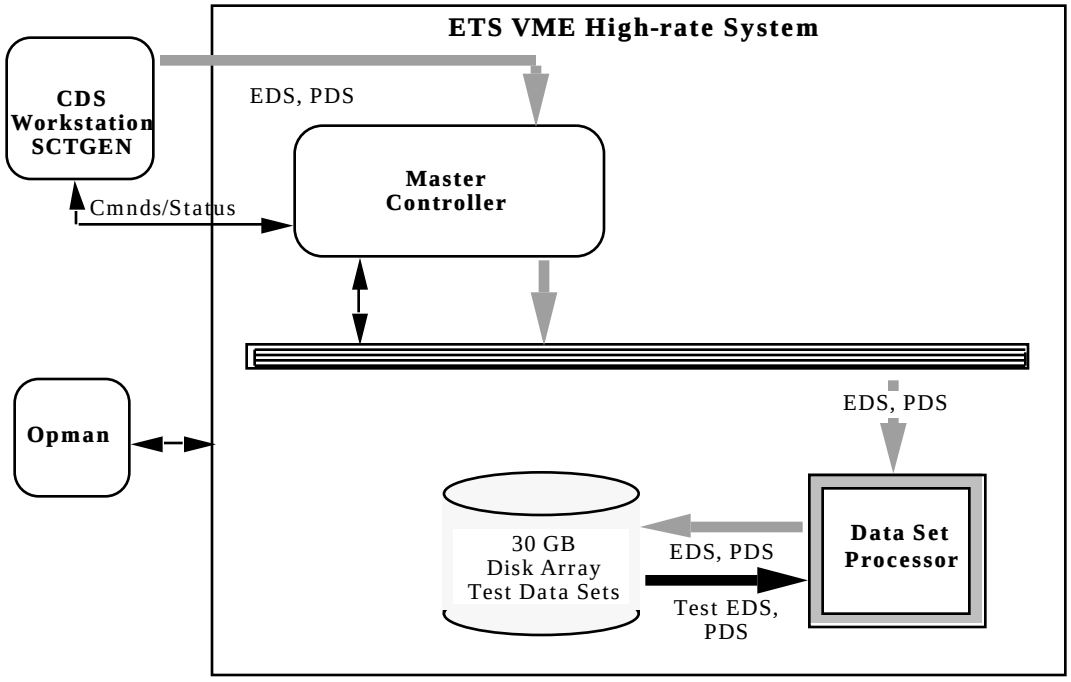


Figure 3-5. SCTGEN Small Data Set Generation

- For large data sets, greater than allowable space on the CDS, direct the write device to the SONY via the Triplex system.
- Once the data sets are created, use the PLAYBACK mode from the TRS to write the data back in to the CDS a data set file at a time.
- Once a data set file is on the CDS, FTP the data set to the ETS VHS Ciprico.

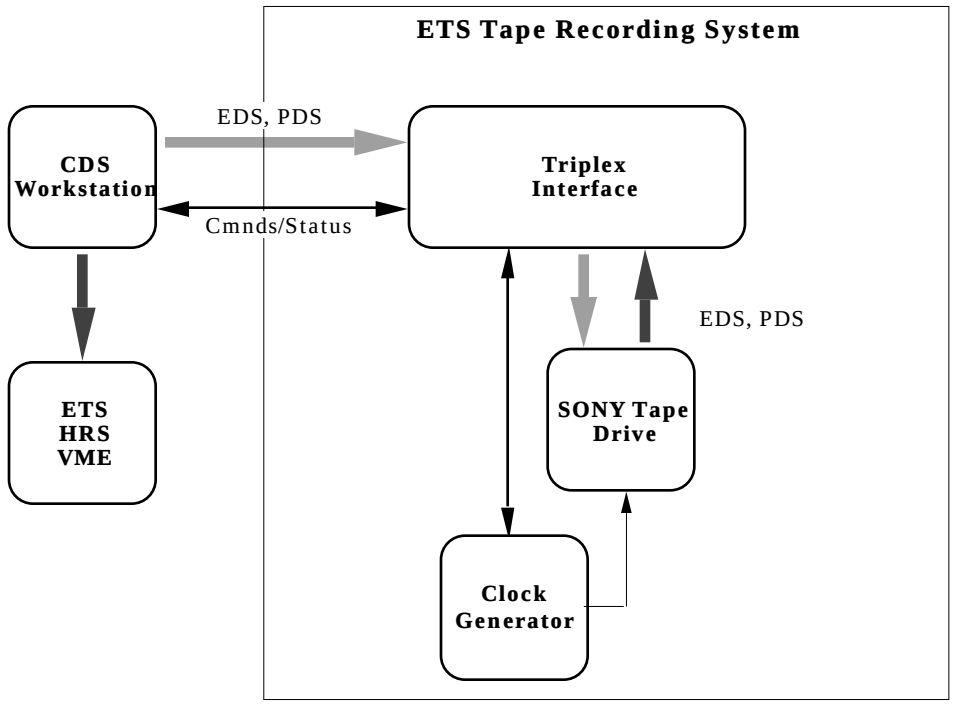


Figure 3-6. SCTGEN Large Data Set Generation

3.2.1.2 LZP-Generated Data Sets:

- Ensure that the system in the "LZP" mode.
- This mode will ingest a stream of CADUs from either the SIM card or the TRS, frame synchronize these CADUs, perform RS detection and correction, and perform path (or packet) service on the extracted VCDUs.
- From the UI select the *Load* or *Edit* option.
- If *Edit* is selected, type in the name of the catalog to be loaded and edited.
- The opened catalog will display the editable pages.
- After re-editing the catalog, the option to *Save* and/or *Activate* is used to run the catalog.
- If *Load* is selected, type in the name of the file to be loaded.
- Once the file is loaded the option to *Enable* is used to run the catalog.
- The various status pages will monitor the processing status.
- Once the whole data scenario, i.e. the specified number of CADUs have been processed, the AP will create a directory listing of the available data generation instructions on the AP disk, and the SV together with the RE would have stored sorted packets on the Ciprico.
- In the commands list, select the *Data Set Distribution* command.

- From the displayed page select the *Browse* option for the session under review.
- From the listing of the files, select the specific file for transfer and enter the destination for the file.
- From the displayed file select the *Ship It!* option to send the file out to the CDS.

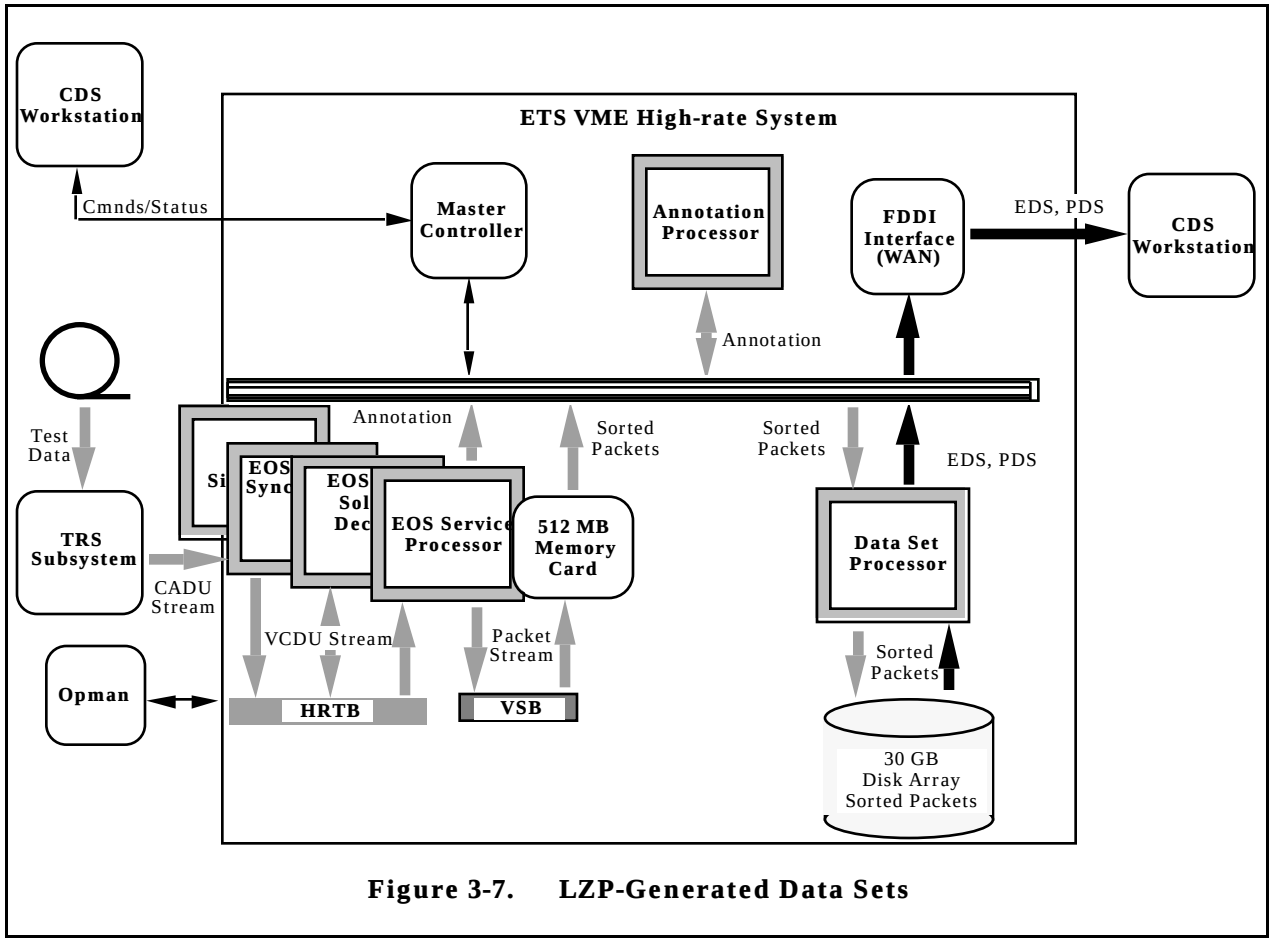


Figure 3-7. LZP-Generated Data Sets

- Once a file is on the CDS, use the RECORD mode on the TRS via the GUI to store it on the SONY (TRS).
- Once all the files are transferred, the data on the Ciprico can be over-written.
- When needed, the data sets are transferred from the TRS to the HRS Ciprico via the CDS.

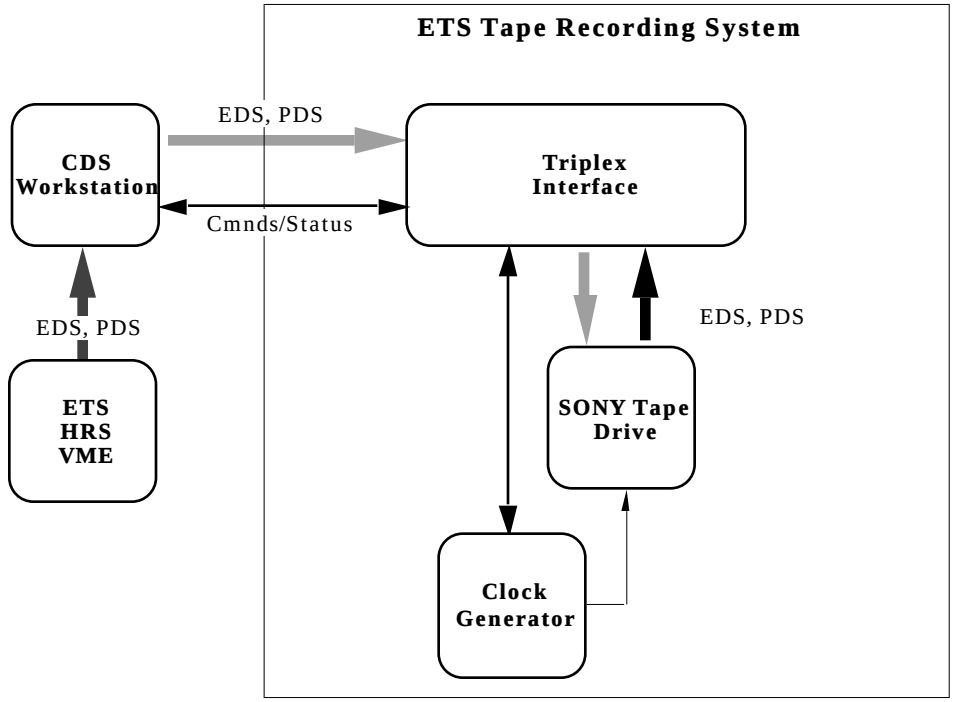
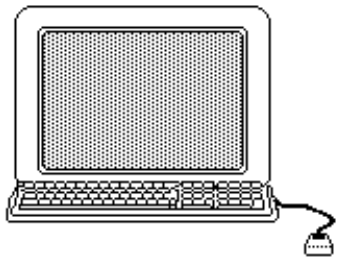


Figure 3-8. Off-line storage & Re-staging of LZP Generated Data Sets

SECTION 4
ETS VHS - LOCAL OPERATIONS (OPMAN)



This section describes system setup, control, and status of the ETS VME High Rate System rack using the Code 521-developed OPMAN operator's interface.

Procedures for operations via the TPCE interface, a GUI-based user interface, are detailed in a separate section/document.

4.1 OPMAN

4.1.1 GETTING STARTED

Once the system is turned on and a VT-100 (or equivalent) terminal is plugged into the ETS VHS rack, the operator can use a local program (residing on the MCC after the system is booted) called OPMAN that runs on the VT-100 to control and monitor the system. Through OPMAN, the system can be set up to perform major data processing functions; each function can have minor deviations that make slight changes to system processing. Because of this versatility, system setup from the ground level is a very detailed procedure, and the intricacies of system setup should be handled only by someone well versed with the system. However, most operators will have access to a batch of system setup files that have already been defined and stored. The user needs to match the correct file to the type of data that the system is expecting, and load the system with that previously stored setup. Another terminal can be plugged into the ETS TRS rack to communicate with the TRS control and monitor system using command line inputs. Following this procedure, ETS HRS is ready to operate from the local control terminal.

In the case of the VHS, the OPMAN catalogs are the foundation of system setup. Catalogs are files that define system configuration and data flow by defining the exact setup of each card included in the data flow; therefore, catalogs also determine system output. OPMAN allows the operator to create, save, and edit catalogs. Once a catalog is created and saved, this catalog may be accessed at any time (by name) and loaded into the system in preparation for data input.

Because setup is usually already defined, the operator's main task involves monitoring system processing. OPMAN provides a series of "Status Pages" for this purpose. Status Pages provide detailed information on system processing. The types of status information available start at the top level and continue to the exact input, output, and processing that occurs on each card. In addition to Status Pages, the operator can monitor system status by observing the LEDs on the front panel of each card. The lighting and dimming of LEDs, especially those on the custom portion of each card, reflect system processing.

Figure 4-1 overviews local operation of the ETS VHS. OPMAN runs on the Operator's Console (asynchronous terminal, VT-100 or equivalent) connected to J13 on the I/O panel.

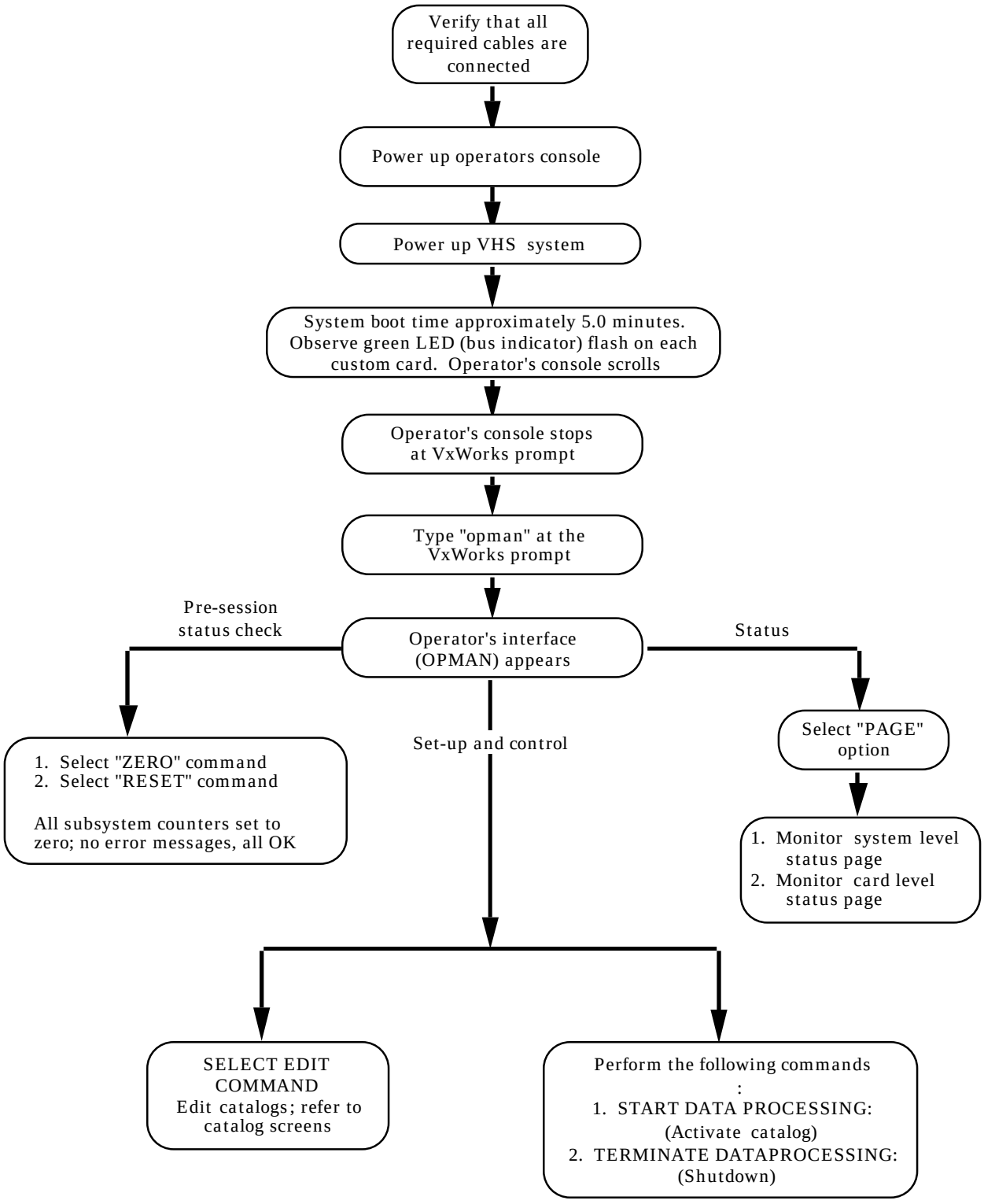


Figure 4-1. Flow Diagram for Local Operation of ETS VHS

4.1.2 OPMAN MAIN MENU

The OPMAN Main Menu, shown in Figure 4-2, appears on the local terminal after system bootup. The Main Menu lists 14 commands or options that appear at the bottom of the screen. The top of the screen displays the Help screen, which provides the user with directions for implementing the available commands and moving around the OPMAN screens. To return to the Help screen at any time, select the Page option and select Help.

The Main Menu provides all of the commands that an operator needs to set up ETS VHS using a previously created OPMAN catalog. It also allows the operator to create a new catalog and access the Status Pages. The following sections describe each command available from the Main Menu.

4.1.2.1 Page

The Page command accesses status screens, system health information, and help.

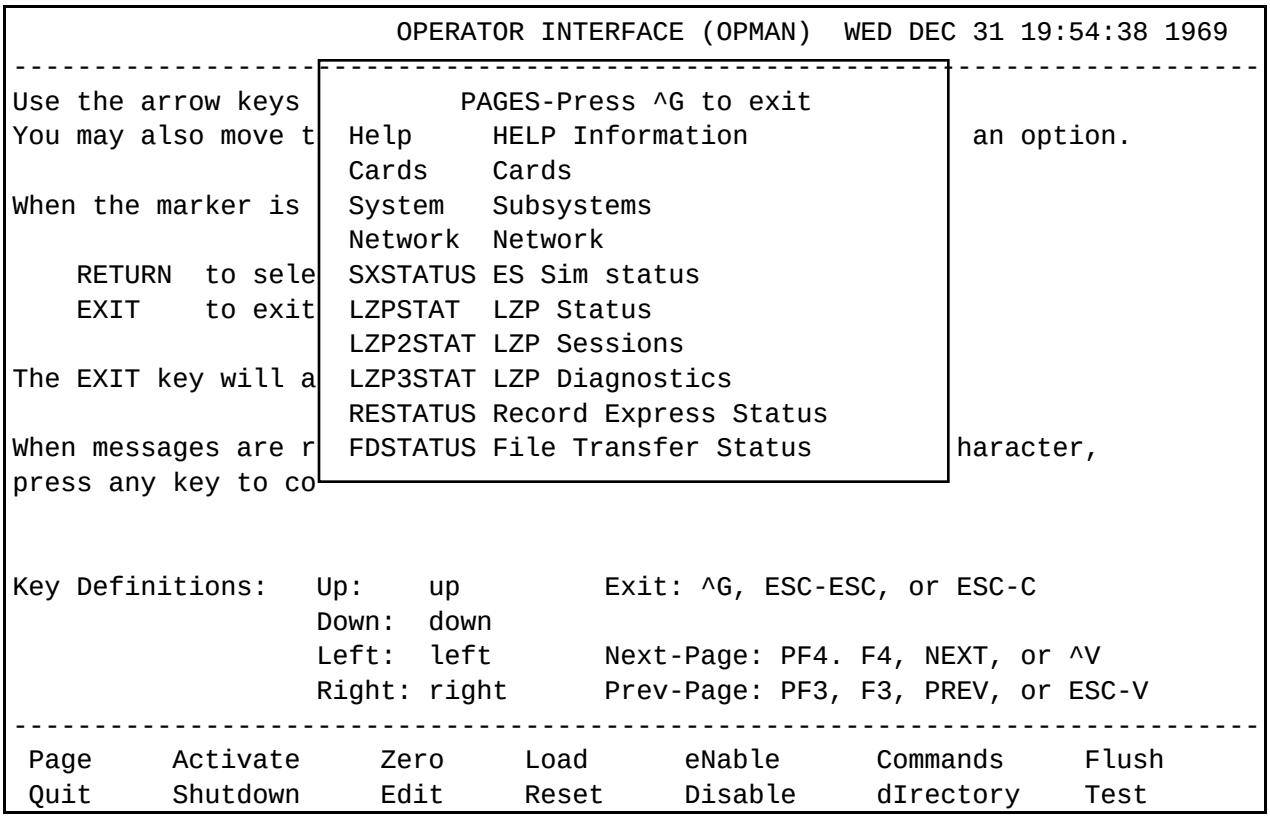


Figure 4-2. Main OPMAN Menu - Operations Mode of ETS VHS

4.1.2.2 Quit

The Quit command exits OPMAN and returns to the VxWorks prompt. To return to the operator interface once Quit has been implemented, enter **opman** at the VxWorks prompt.

Quit exits the OPMAN operator interface. Quit includes one verification question that prompts the user beforehand, so that inadvertent implementation is prevented.

4.1.2.3 Activate

The Activate command is the equivalent of a combination of Reset, Load, and Enable: it resets, loads, and then enables a catalog (the Reset, Load, and Enable commands are defined in Sections 4.1.2.7 through 4.1.2.9). If the catalog includes an ETS VHS simulation source (Simulator Card), as is for the case when the VHS is sending a serial stream of CADUs via the ECL outputs, this command initiates a data flow because the data source is enabled. However, if the data source is exterior to ETS VHS, as is for the case when the TRS is sending a CADU stream to the VHS for synch alignment, this command prepares the system to receive data, and data flow through the system begins when the data source begins data input.

The Activate command includes all cards in the catalog, but before implementation, it prompts the operator with a list of the included cards (indicated by an X in front of the card name). To exclude one of the cards from the data flow, remove the X and leave a blank in its place—that card will not be included in the Activate command.

4.1.2.4 Shutdown

The Shutdown command disables and flushes selected subsystems. This command can be used to interrupt a data flow; upon its implementation, data flow stops. The **Shutdown command should always be implemented** before a new catalog is activated.

The Shutdown command includes all cards currently enabled, but before implementation, it prompts the operator with a list of the included cards (indicated by an X in front of the card name). To exclude shutdown of one of the enabled cards, remove the X and leave a blank in its place—that card will not be shut down.

CAUTION: This command clears the catalog name from all Status Page results.

4.1.2.5 Zero

The Zero command sets the counters on all cards to zero. Upon implementation, all Status Page values are immediately set to zero. Zero can be implemented during a data flow, but all Status Page final results only reflect the processing that occurred after the Zero command was implemented.

After a data flow ends and the results are recorded, it is **recommended that the operator zero all counters** before the next data flow starts. Unless a new catalog is activated, counters are not automatically zeroed. Even if a new catalog is activated, if that catalog does not include all cards used in the previous data flow, the status of cards not included in the current catalog are NOT zeroed; this can cause confusion when examining results.

4.1.2.6 Edit

The Edit command allows the user to edit an existing catalog stored in system memory, or to create a new one. If a catalog has already been loaded into memory (an Activate, Load, or Edit command has already been implemented), the Edit command immediately defaults to this catalog—it allows the operator to view the Setup Pages of that catalog.

To edit a catalog when a catalog is not already loaded into memory, implement the Edit option and enter the catalog name at the prompt, or press Return at the prompt to create a new catalog. (To verify a catalog name, implement the fileInfo option, which lists the stored catalog names.) To create a new catalog when a catalog is already loaded into memory (or to edit a different catalog than that currently loaded), proceed as follows:

a. Implement Edit. When the Edit window appears, which lists the cards included in the edit, press Enter. (This accesses the subsystem Setup Pages.)

b. Press the ESC key twice, which causes a new window to appear.

c. Select the Erase option (E) displayed in the window. This erases any changes made to the current catalog loaded into memory since the last save. If new changes to that catalog need to be saved, implement the Save option (S) before the Erase option.

d. Implement the Edit option. To create a new catalog, leave the prompt for a catalog name empty and press Return. To edit a previously stored catalog, enter the catalog name at the prompt.

4.1.2.7 Load

The Load command downloads setup parameters from a previously created catalog to all of the cards included in that catalog. This command by itself does not prepare cards for a data flow, or in the case of a catalog that includes the data simulation source, it does not start the data flow. It simply initializes the cards to process according to that catalog's setup.

The Load command includes all cards in that catalog, but before implementation, it prompts the operator with a list of the included cards (indicated by an X in front of the card name). To exclude one of the included cards, remove the X and leave a blank in its place—that card will not be loaded.

4.1.2.8 Reset

The Reset command clears all counters and registers; both hardware and software. Status Page values are also zeroed as a result. Typically, the Reset command is used before a data flow to initialize system components, and zero all counts from previous data flows. It can also be used as a system health check.

The Reset command defaults to all cards included in the system. However, before implementation, it prompts the operator with a list of the system cards, indicated by an X in front of its name. To exclude one of the cards, remove the X and leave a blank in its place—that card will not be reset.

4.1.2.9 Enable

The Enable command "turns on" cards. It is the final step to prepare the system for data processing; if the Enable includes the data simulation source, it also begins the data flow.

The Enable command defaults to all cards included in that catalog. However, before implementation, it prompts the operator with a list of the included cards (indicated by an X in front of the card name). To exclude one of the cards, remove the X and leave a blank in its place—that card will not be enabled.

For typical operation, the operator uses the Activate command, which includes an Enable. Therefore, the operator rarely implements an Enable command.

4.1.2.10 Disable

The Disable command "turns off" cards. Cards unnecessary to a data flow are disabled in order to avoid confusion during processing.

The Disable command defaults to all cards included in that catalog. However, before implementation, it prompts the operator with a list of the included cards (indicated by an X in front of the card name). To exclude one of the cards, remove the X and leave a blank in its place—that card will not be disabled.

Typically, the operator implements a Shutdown command at the end of a data flow. A Shutdown includes a Disable; therefore, the Disable command is rarely implemented.

4.1.2.11 Commands

The Commands option accesses a variety of system functions that are primarily designed for debugging. One Command is used for creating data sets from the PAT files that are created by the Annotation Processor, namely the Data Set Distribution Command OR for transferring data sets from the Ciprico Disk Array to the external network, i.e. EBnet. This command does not influence data processing in any way.

This is a good option to spend time "playing with" to better understand all of the functions that it makes available.

4.1.2.12 Directory

The Directory command provides "directory" functions. It lists the catalogs that are available in each directory. The catalog lists include a brief description of each catalog; descriptions are written by the catalog author—their accuracy and level of detail are a reflection of that author and not the system itself.

4.1.2.13 Flush

The Flush command forces cards to output data that may not have completed system processing when data flow stopped; thus, that data was not pushed through the final phase of processing by the succeeding data (this situation is frequently described as data being stuck in the telemetry pipeline). By flushing out all remaining data, this command ensures that the card subsystems are empty and ready for a new data flow. If data is "stuck in the pipeline" when this command is issued, the Status Page values actually increase to reflect that more data has completed processing.

Many of the cards' Setup Pages provide timeout values; when set, they cause an automatic flush of data when data input has stopped for a programmable length of time. However, it is recommended that the operator always implement the Flush command at the end of a data flow in case a timeout value was not set.

Like many of the preceding commands, Flush prompts the operator with a list of cards that are flushed by default (indicated by an X in front of the card name). To remove a card(s) from the Flush command, remove the X and leave a blank space in its place—that card will not be flushed.

4.1.2.14 Test

The Test command runs a self-test on each card selected. Health and status are displayed on the Status Pages available via the Page command. Typically, this command is not used after the system design and test phase.

CAUTION: If data is flowing when the Test command is initiated, data is interrupted and destroyed.

4.2 ETS VHS - SETUP AND STATUS

OPMAN catalogs are the setup files that are loaded onto ETS VHS to prepare it for an Operations Mode data flow, or to start an Off-line Mode data flow that includes an ETS VHS internal data source. Creating a new catalog and editing old catalogs are both accomplished using the Edit command available from the OPMAN Main Menu.

First, the operator must understand that he/she is essentially setting up the custom chassis portion of the ETS VHS rack; and on that chassis, the operator is setting up only the custom software. The disk modules play an active role in system processing, but the operator does not really set them up. If a catalog (the system setup) requires use of several cards, make sure that these cards are selected with an asterisk.

Catalogs are broken down according to the card, mezzanine, or module that is being set up. A card can have one Setup Page, or as many as required.

This section describes the pages that can be included in an OPMAN catalog; not every page explained has to be present. There are two modes of operation for the ETS VHS, namely the Operations Mode, referred to as the Big Disk mode, and the Off-line mode referred to as the LZP mode. In the Operational Mode, there is a small subsets of cards that are enabled at boot-up. The listing of these cards together with the configurations in which they will be used, and the set-up and status pages descriptions will be described in the following paragraphs.

4.2.1 ETS VHS OPERATIONS MODE - DATA SET TRANSFER

The ETS HRS is booted such that it comes up in the Big Disk Mode. In the Big Disk Mode, only three cards are active, i.e. moving data across the VME back plane. In this mode, for the Data Set Transfer test configuration, there is no need to activate a catalog. The data sets, EDSs and PDSs which are stored on the Ciprico have to be transferred interactively by the user. The user must choose the Commands option and select the FD, Data Set Transfer Command. This selection will open up a window as shown in Figure 4-3. This menu is brought up from any page on OPMAN. Essentially this allows the user to bring up the ETS VHS Data Set Distribution capability.

browse: This command will display the list Data Set files on the Ciprico Disk Array

filename: Any filename selected on the Ciprico Disk Array when clicked on will appear in this field entry. The files are named in accordance with the PDSs and EDSs file naming convention, as specified EDOS-EGS ICD.

file name at target: This field can be kept blank or filled in to accept a new name for the data set that is being transferred from the listed files.

target directory: The target directory on the EDOS or EDOS specified host will be entered here.

target host: The name of the target platform has to be entered here as the host.

user name: The user who initiates the transfer needs to have write permission on the directory selected, and as such the user name must be entered here.

password: The user password must be typed in here to enable writing in to the specified target directory. The password will not be displayed.

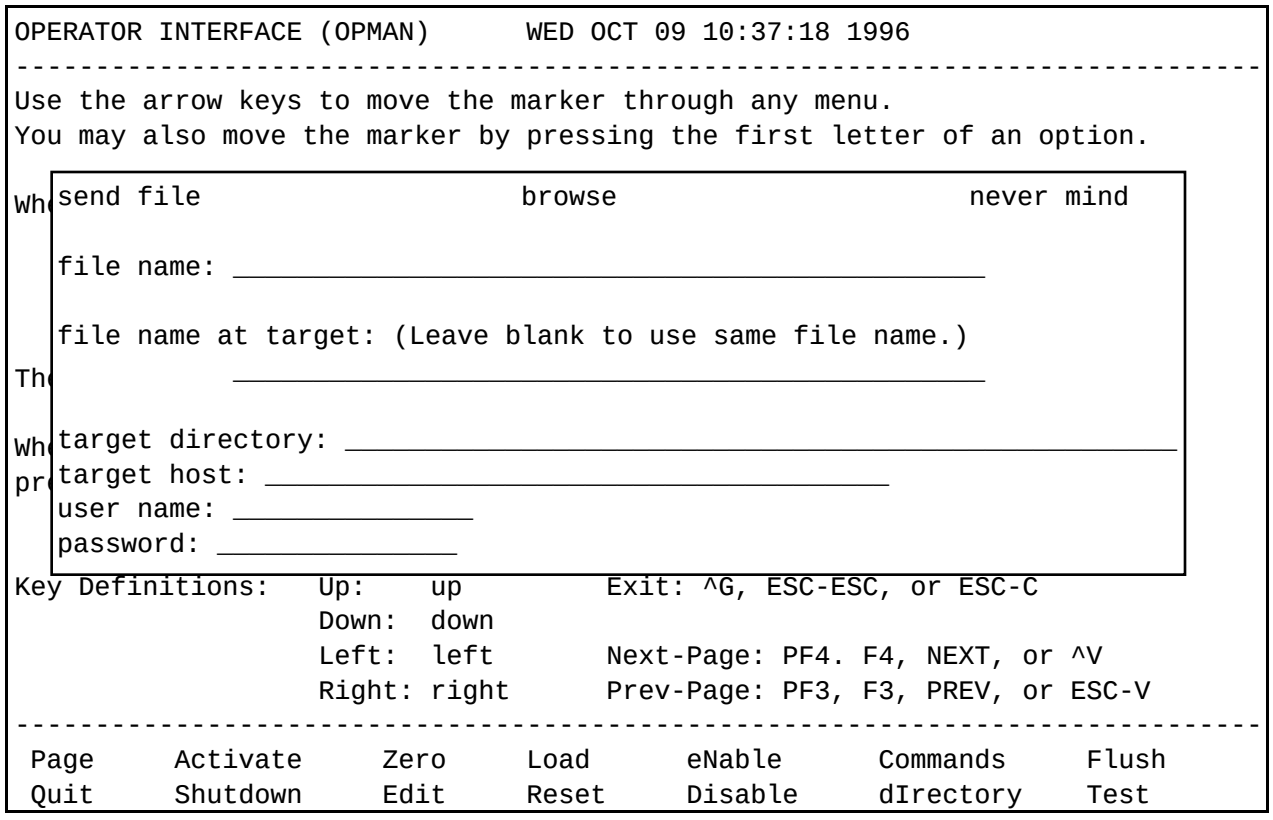


Figure 4-3. Command Option in ETS VHS Operations Mode

send file: This command will transfer the selected file over the FDDI network.

never mind: This command is essentially a cancel command for the data set transfer.

In this mode the normal FTP protocol is used to transfer the data sets. With the implementation of the Kerberos password authentication, the data set transfer will utilize KFTP. The storage of data set files on the Ciprico Disk Array is an off-line function and as such will be described in the Off-Line Mode sub-section. When the data set transfer is in progress, the Page option from the bottom of the OPMAN screen will enable the user to select the FD Status Page, shown in Figure 4-4. The following fields from the FD Status Page reflect the status of the data set transfer function and are defined as follows:

FD1 Catalog: System catalog name that was enabled when this status information was generated.

Health: Displays status of hardware during operation. Field may read OK, GOOD, BAD, DEAD, or Booting.

Enabled: Indicates whether card is ready to transfer/receive data (Yes/No).

Client Host: Displays the host address for the transfer/receipt of data sets

Mode: Displays the mode either transfer or receipt of data sets

Progress: Indicates the status of the transfer

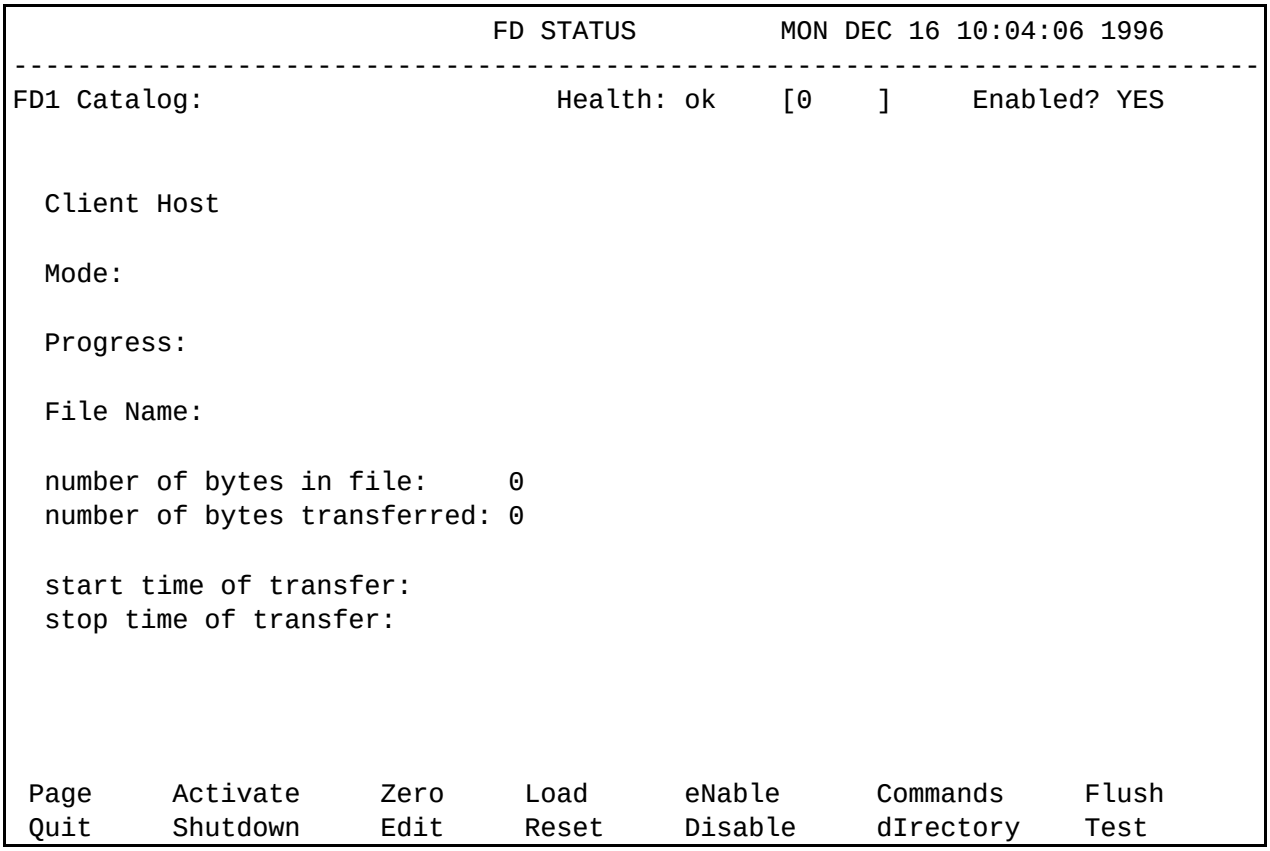


Figure 4-4. FD Status Page in ETS VHS Operations Mode

File Name: This field contains the name of the file transferred

Number of bytes in file: The size of the file in bytes to be transferred appears in this field.

Number of bytes transferred: The size of the file in bytes transferred appears in this field.

Start time of transfer: This field contains the start time of transfer of the file.

Stop time of transfer: This field contains the stop time of transfer of the file.

4.2.2 ETS VHS OPERATIONS MODE - DATA SET RECEIPT

In this mode, the ETS HRS has to be in the ETS Operations Mode. The FTP deamon runs on the VME rack and when the external entity FTPs a file to the system, the data set files are stored on the Ciprico Disk Array. The FD Status Page, shown in Figure 4-4, will monitor the transmission of the data set files.

4.2.3 ETS VHS OPERATIONS MODE - SIMULATOR CARD RETURN LINK SIMULATION

In this mode the Return Link CADU Data Stream is simulated using the Simulator Card. The SCTGEN created base file is loaded on to the Simualtor Card on board 4 MB memory using a Catalog. The Simulator Set-up page is shown in Figure 4-5. The data output rate and the update option are selected to accomodate the requirements. If the Update file option is to be used, the Update option has to be turned on, i.e. 'YES'. The present version of the Simulator software does not support the hardware option for updates, and as such the software option is used. This option will support a maximum update rate of 70 Mbps.

```
SX1        SIMULATOR CARD SETUP              THU OCT 01 20:20:03 1996
                        HRSSIM v@ 'hr clean test 3'
--------------------------------------------------------------------------------

DATA FILE SET
   Data File Name.........>/ets/data/hrssimcln.b
   Bytes per frame[1024]..>1024__        Number of Frames[0=all]..>0____
   Update (yes/no) [NO]...>YES__         Update by HW [YES].......>NO_

CLOCK INPUT
   External Clock[NO].....>NO_
   NCO Frequency[20]......>100_____      MHZ (no=KH)[YES].........>YES

SIMULATOR SETUP
   Frame Output Mode (0=RI, 1=FI, 2=RT, 3=FT)[3]...................>3_
   Running Mode (0=No*xfer, 1=1*xfer,2=X*xfer,3=forever[3].........>2_
      If Run*Mode=2, Enter * of Frames.........>1000000
   CRC yes/no [NO]........>NO_           RS yes/no [NO].........>NO_
   BTD yes/no [NO]........>NO_           Interleave 1-8 [4]......>4_
   Slip Function [NO].....>NO_
    Slip1:Gain(yes)/lost[NO]..>NO_    Slip2:Gain(yes)/lost [NO]..>NO_
    Number of bits(0-3) [0]..>0_      Number of bits(0-3) [0]....>0_
    Frame position..>0_______         Frame position..>0_______
    #Byte in Frame..>0_____           #Byte in Frame..>0_____

Use the RETURN key and arrow keys to move around the page.
Next-page ^V, F4, PF4
Prev-pageESC-V, F3, PF3                   Exit ^G, ESC-C, ESC-ESC
```

Figure 4-5. Simulator Card Set-up Page in ETS VHS Operations Mode

The Simulator Card setup fields are defined as follows:

Data File Name: Specify test data source file name. Data file name must have one of the following extensions: either .CADU (indicates frame data, with no updates), or .b (indicates that this is a base file which will use updates). The Data file is generated using SCTGEN.

Bytes per Frame: Specify number of bytes within a frame.

Number of Frames: Specify number of frames to be loaded into the card for the test.

Update: Specify if test data is to be generated with required update information.

Update by Hardware: Select an option to generate updates using hardware on the card or software version

External Clock: Select a clock source for card.

NCO Frequency: Specify the rate at which data is output from the card in Mbps or Kbps.

Frame Output Mode: Specify the output clock and data mode as reverse inverted (RI), forward inverted (FI), reverse true (RT), or forward true (FT).

Running Mode:. Specify the total number of data units (frames or blocks) output from the card each time it is activated, or set up the card to continuously output data (after activation) until it is shut down. To specify a fixed number of data units output from the card, enter 2. Then, enter the number of data units to the right of the "If Run*Mode=2, Enter * of Frames" field. To select continuous data output, enter 3.

RS: Select if the data is to be Reed-Solomon encoded by the hardware.

BTD: Select if the data is to be Bit-transition-density encoded by hardware.

Interleave: Select the interleave level for RS encoding the data.

Slip Function: Select if the test data is to have bit-slip implemented. If so there are two positions within the base set that can be set for bit-slip.

Slip 1 & 2: Select the gain/loss option and number of slip bits to be tolerated.

Frame Position: Select the frame position (e.g., 5th frame) in a string of CADU test data where the bit-slip is to be injected.

Number of Bytes in Frame: Specify the position within the frame where the bit/s will be slipped.

Once the card has been set-up, the values can be saved in a catalog. Once the Update file is in the system Simulator disk, the catalog is activated. The status of the data output is monitored on the Simulator Status page, shown in Figure 4-6, that is displayed using the Page option at the bottom of the OPMAN screen.

The Simulator (SX) Subsystem Status page provides a quick status overview of the Simulator card, and are defined as follows:.

SX1 Catalog: The name of catalog the is used to setup Simulator Card.

Version of file: Simulator setup allows the operator to create multiple versions of the same file. This version number indicates which version of the file is being used in the current processing.

Health: Displays status of hardware during operation; may read Ok, Good, Bad, Dead, or Booting.

Enabled? Indicates card is either enabled or disabled (Yes/No). An enabled card is ready to process data; in the Simulator Card's case, an enabled card should be outputting data.

DATA FILE SET:

Base File Name: Indicates the name and path of data set file.

Frame Size: Indicates number of bytes in a frame.

Update Function: Indicates whether the update function is exercised.

Number of Frames: Indicates number of frames to be generated.

Total Memory Size: Indicates number of available bytes loaded in to memory.

```
                        Simulator Card STATUS    TUE OCT 01 20:36:09 1996
------------------------------------------------------------------------------
SX1 Catalog: HRSSIM              Health: ok    [0    ]     Enabled? NO


DATA FILE SET
    File Name............> /ets/data/hrssimcln.b
    Frame Size...........> 1024           Number of frames.....> 100000
    Update Function......> NO             Total Memory Size....> 4 MB

SIMULATOR STATUS                     Simulator board......Revision 0
    Running Mode.........> Stop
    Frame Output Mode....> FT         Output Frequency.....> 100     MH
    CRC.....>NO  RS......> NO         Output Frame Count...> 0
    BTD.....>NO  Interlv.> 4                Slip function........> NO
    Frame_num injected...> 0                Frame_num injected...> 0
    Gain/Lost bits.......> LS               Gain/Lost bits.......> LS
    slip bit number......> 0                slip bit number......> 0
    Byte position........> 0                Byte position........> 0
ESCOM seconds counter....> 31476


 Page     Activate     Zero     Load      eNable      Commands     Flush
 Quit     Shutdown     Edit     Reset     Disable     dIrectory    Test
```

Figure 4-6. Simulator Card Status Page in ETS Operations Mode

SIMULATOR STATUS**:**

Running Mode: Indicates whether Simulator is generating continuously or stopped after a fixed number of frames.

Frame Output Mode: Indicates whether data is generated in Forward True, Reverse True, etc.

CRC: Indicates if CRC encoding scheme is used.

RS: Indicates if Reed-Solomon encoding scheme is used.

BTD: Indicates if Bit-Transition-Density encoding scheme is used.

Interleave: If RS encoding is specified, indicates the RS interleave level.

Frame_num injected: Indicates which frame number relative to the 4 M of memory that the first slip function.

GaiN/LoSt bits: Indicates "GN" if a gain of a bit is injected. Indicates "LS" if a loss of a bit is injected in the first slip function.

Slip Bit Number: Indicates 0, 1, 2, or 3 defining the number of bit slip(s) to be injected.

Byte Position: Indicates which byte in the frame the slip bit is to be injected.

ESCOM seconds counter: Indicates the number of seconds elapsed since the card has been commanded.

Simulator Board: Indicates hardware revision number of the board.

Output frequency: Indicates the clock output frequency (e.g., 100 Mhz).

Output frame count: Indicates the number of frames to be output.

Slip Function: Indicates "NO" if no slip function is selected. Indicates "YES" if either one of two slip functions is selected.

Frame_num injected: Indicates which frame number relative to the 4 M of memory that the second slip function.

GaiN/LoSt bits: Indicates "GN" if a gain of a bit is injected. Indicates "LS" if a loss of a bit is injected in the second slip function.

Slip Bit Number: Indicates 0, 1, 2, or 3 defining the number of bit slip(s) to be injected.

Byte Position: Indicates which byte in the frame the slip bit is to be injected.

4.2.4 ETS VHS OFFLINE MODE - LEVEL ZERO PROCESSING

This mode utililizes the in-built capabilities of the ETS VHS. The firmware and software is re-used from earlier projects developed by Code 521, modified to resemble as closely as possible the structure of the data products outlined in the EDOS-EGS ICD. The processing algorithms are not the same, and as such the statistics will not be the same as those generated by the EDOS

processing elements. Since there is no requirement to replicate the EDOS processing elements, the LZP Mode is only used to verify the validity of data set transfers to and from EDOS.

4.2.4.1 Page

The subsystem status that are active in this mode of operation are displayed when the Pages option is selected from the Main OPMAN menu, as shown in Figure 4-7.

The Page command accesses status screens, system health information, and help. From this screen, the operator can access Help and specific Status Pages. Status Pages include system health information, an ETS HRS summary page for system-level status, and individual card status pages, each delineated by an appropriate name.

```
                                    (Help Screen)

                            OPERATOR INTERFACE (OPMAN)           07/12/94 10:25:03
      ------------------------------------------------------------------------------
Use the arrow keys to move the marker through any menu.
You may also move the marker by pressing the first letter of an option.

When the marker is adjacent to a desired option, press ...

    RETURN  to select the option
    EXIT    to exit the current menu

The EXIT key will also work for any prompt.

When messages are reported and the cursor rests on the '+' character,
press any key to continue.

Key Definitions:   Up:        Up         Exit: ^G, ESC-, or ESC-C
                   Down:      Down
                   Left:      LEFT       Next-Page: PF4, F4, NEXT, or ^V
                   Right:     RIGHT      Prev-Page: PF3, F3, PREV, or ESC-V
-------------------------------------------------------------------------------

 Page     Activate         Zero     Load      eNable      Commands     Flush
 Quit     Shutdown         Edit     Reset     Disable     dIrectory    Test
```

Figure 4-7. Pages Option - Offline Mode of ETS VHS

4.2.4.2 Cards

The CARDS Page, shown in Figure 4-8, consists of the following software status: base address for each card (vbrbase); date that software was compiled; version of software; global parameter card base address (pcabase) on VMEbus; and global status base address (stsbase) on VMEbus.

```
ETS                      MON OCT 07 11:15:53 1996

                                      vbrbase          v  pcabase  stsbase
SX1 ok    0                          D0000000°           D00D35E4 00000000
FS1 ok    0                          D0800000          b D08CF878 D08CF67C
RS1 ok    0                          D1000000          a D13F8104 D13F59EC
SV1 ok    0                          D1800000°           D18B9F64 00000000
RE1 ok    0                          70000000            70F71078 70F70D78
AP1 ok    0                          10000000            11F7110C 11F70FF4

 Page      Activate      Zero      Load      eNable      Commands      Flush
 Quit      Shutdown      Edit      Reset     Disable     dIrectory     Test
```

Figure 4-8. Cards Page - Offline Mode of ETS VHS

This page must be checked before activating a catalog. If all the cards display an 'OK', this means that they have booted up correctly and can be activated.

4.2.4.3 System

The System Status Page, shown in Figure 4-9, lists each ETS HRS subsystem, status, file name used to enable (ENA) each subsystem, and a description of the file.

```
ETS                      TUE OCT 01 20:38:31 1996

 LZP LZP Subsystem
 _MC Master Controller
 TBP TBP Subsystem
 DP1 Data Set Processor
 RE1 Record Express
 AP1 Annotation Processor
 SV1 Service Processor        DSB
 RS1 Reed-Solomon             DSB
 EF1 EOS Frame Sync           DSB
 SX1 Sim                      DSB



 Page      Activate      Zero      Load      eNable      Commands      Flush
 Quit      Shutdown      Edit      Reset     Disable     dIrectory     Test
```

Figure 4-9. System Status Page - Offline Mode of ETS VHS

No file is displayed for a disabled (DSB) subsystem. Any card or subsystem errors are reported on this page.

4.2.4.4 Network Status

The Network Status Page, shown in Figure 4-10, lists activities associated with socket and port connections. Port is assigned to each known task connection (e.g., Port 3001 is used for Commands & Responses); therefore, the user can quickly identify the health of each port.

```
Ethernet Connections        TUE OCT 01 20:38:01 1996



                            Listen  Data    Connect
Port    Sent      Received  socket  socket  count
3001    25        25        21      32      1       Commands & Responses
3100    8         0         25      -1      8       Status
3201    0         0         22      33      1       Event Messages



 Page     Activate     Zero     Load      eNable      Commands     Flush
 Quit     Shutdown     Edit     Reset     Disable     dIrectory    Test
```

Figure 4-10. Network Status Page - Offline Mode of ETS VHS

4.2.4.5 Edit

The Edit command allows the user to edit an existing catalog stored in system memory, or to create a new one. If a catalog has already been loaded into memory (an Activate, Load, or Edit command has already been implemented), the Edit command immediately defaults to this catalog—it allows the operator to view the Setup Pages of that catalog.

To edit a catalog when a catalog is not already loaded into memory, implement the Edit option and enter the catalog name at the prompt, or press Return at the prompt to create a new catalog. (To verify a catalog name, implement the fileInfo option, which lists the stored catalog names). To create a new catalog when a catalog is already loaded into memory (or to edit a different catalog than that currently loaded), proceed as follows:

a. Implement Edit. When the Edit window appears, Figure 4-11, which lists the cards included in the edit, press Enter. (This accesses the subsystem Setup Pages.)

b. Press the ESC key twice, which causes a new window to appear.

c. Select the Erase option (E) displayed in the window. This erases any changes made to the current catalog loaded into memory since the last save. If new changes to that catalog need to be saved, implement the Save option (S) before the Erase option.

d. Implement the Edit option. To create a new catalog, leave the prompt for a catalog name empty and press Return. To edit a previously stored catalog, enter the catalog name at the prompt.

The following screen is the first to appear after implementing the Edit option; it allows the operator to select which cards are included in the catalog:

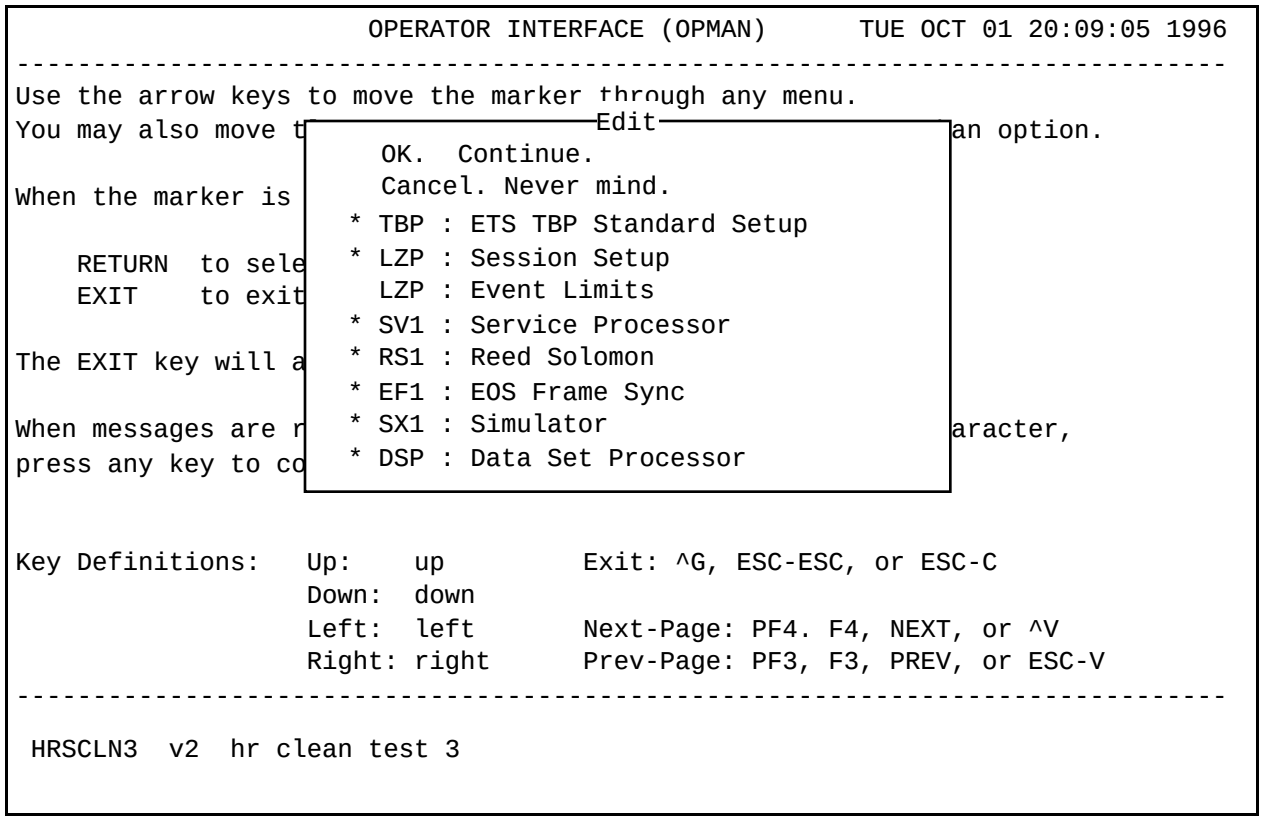


Figure 4-11. Edit Page - Offline Mode of ETS VHS

The "*" before a card name indicates that a card is included; removing the "*" and replacing it with a blank space removes that card from the setup file. If the card does not play an active role in data processing, it should be removed from the catalog. Although it can be excluded at the time of catalog activation, it can cause confusion or incorrect data processing if left as part of the catalog and inadvertently activated.

To set up a new catalog, or to edit an old catalog, press Return. Once the editing process begins, PF4 advances forward through the catalog page by page. PF3 advances backward through the catalog by the first page of each card's setup. Press ESC twice to access a screen that describes the catalog and provides options to save, erase, or continue editing. To return to the OPMAN Main Menu without implementing any of these options, press ESC twice more. This screen also allows the operator to name the catalog, enter a brief description of the catalog, create multiple versions of catalogs with the same name, and save the catalog to a specific directory.

NOTE: The Save option overwrites the last setup saved with that same catalog name and version.

4.2.4.6 Frame Synchronizer Card Setup

The first card described for setup is the Frame Synchronizer Card, shown in Figure 4-12. This is brought up by sifting through the cards available for editing. It is preferable to have all the information at hand before starting an Edit session. As explained in the previous paragraphs, if an existing catalog is to be edited, most of the information may already be entered, and only changes need to be made to test specific injected errors in the test data, for example, synchronization errors.

```
EOSFS       EF1          EOS FRAME SYNCHRONIZER SETUP  TUE OCT 01 20:23:32
1996
                     HRSCLN3 v2  'hr clean test 3'
--------------------------------------------------------------------------------
sync pattern 1ACFFC1D     sync mask FF              ECL mux 3
sync size bytes 4         crc enabled NO_            0:output TTL mux
frame size bytes 1024_    include sync in crc YES    1:J2 data & oper clock
true search tol 0_        CRC initial state 1        2:J2 test data & clock
invert search tol 0_      crc coefficient $1021      3:front panel SMAs
accept forward sync YES   output when? 3    3:lock  TTL mux 0       0:off
accept reverse sync NO_    2:check 1:always 0:none   1:RS422 clock & data/
accept true sync YES      search/check slip 0          front panel DB9
accept invert sync NO_    lock/flywheel slip 0       2:J2 rs422 clock & data
fix inverted data NO_     flywheel tolerance 1_      3:test mezz clock & data
fix inverted sync NO_     check tolerance 0_        trailer 3
fix reverse data NO_      qlf mux input 1__          0:none 1:2-byte quality
best match policy YES     quicklook output mode 1    2:6-byte timecode
output size (16,8) 16      0:byte  1:word            3:8-byte quality+timecode
ram I/O control $2146                               PN decode 0     0:none
                                                    1:decode, include sync
                                                    2:decode, exclude sync

Use the RETURN key and arrow keys to move around the page.
Next-page ^V,F4,PF4
Prev-page ESC-V,F3,PF3                  Exit ^G,ESC-C,ESC-ESC
```

Figure 4-12. Frame Synchronizer Setup Page - Offline Mode of ETS VHS

The Frame Synchronizer Card setup fields are defined as follows:

sync pattern: This field accepts up to a 32-character (16 bytes) string reflecting the sync pattern to synchronize. ETS uses 1ACFFC1D

sync size bytes: This defines the size in bytes of the sync pattern expected. For ETS use 4.

frame size bytes: This field defines the size in bytes of the frame including the sync pattern. For ETS HRS, (interleave 4 is used), the frame size is 1024 bytes.

true search tol: This indicates the number of bytes in error in the sync pattern the user is willing to tolerate in synchronizing the true (non-inverted) frame.

invert search tol: This indicates the number of bytes in error in the sync pattern the user is willing to tolerate in synchronizing the inverted frame.

accept forward sync: This indicates to the card the forward direction of the data sync pattern to be accepted.

accept reverse sync: This indicates to the card the reverse direction of the data sync pattern to be accepted.

accept true sync: This indicates to the card the non-inverted data sync pattern to be accepted. This is set in conjunction with the tolerance values.

accept invert sync: This indicates to the card the inverted data sync pattern to be accepted. This is set in conjunction with the tolerance values.

fix inverted data: This instructs the card to convert the inverted data to true or non-inverted data.

fix inverted sync: This instructs the card to convert the inverted clock to true or non-inverted data.

fix reverse data: This instructs the card to convert the reverse data to forward data.

best match policy: This instructs the card to use the best match in synchronizing on to the sync pattern. In ETS HRS this is set to YES.

output size (16,8): This defines the output from the FS card. It will be word size for ETS, i.e. 16.

ram I/O control: For ETS, we will use the default vale of $2146.

sync mask: This field is used when the user wants to mask out certain bits in the sync pattern. The default is FF, when no bits are masked out.

CRC enabled: Instructs the card that CRC has been enabled, and hence CRC is checked. Not used for ETS.

include sync: This determines whether the sync pattern has been included in the calculation of the CRC check symbol. Not used for ETS.

CRC initial state: This determines the initial state of the CRC. Not used for ETS.

CRC coefficient: This defines the CRC coefficient, the default being $1021. Not used for ETS.

output when? This instructs the FS card when to output the frames after the synchronization strategy. The options are when a frame is in the following modes: lock:3 (in lock only), check:2 (in check & search), always:1 (in search, check or lock), or none:0 (never)

search/check slip: This defines the slip window strategy for synchronization in the search and check modes. This field can be set from 0 to 3.

lock/flywheel slip: This defines the slip window strategy for synchronization in the lock and flywheel modes. This field can be set for bit slips from 0 to 3.

flywheel tolerance: This defines the tolerance strategy in the flywheel mode. This field can be set for flywheel frames from 0 to 16.

check tolerance: This defines the tolerance strategy in the check mode. This field can be set for check frames from 0 to 16.

qlf mux input: This field defines the state of the quicklook output FIFO. This field can be set from TBS. ETS uses the default value of 1.

quicklook output

mode: This defines the output mode of the quicklook FIFO, i.e. 0:byte or 1:word. For ETS it is set to 1:word.

ECL mux: This sets the ECL mux state. The values that can be set are as follows:

0: output TTL mux (accept output from TTL mux);
1: J2 data & oper clock (accept data and oper. clock from the J2 connector);
2: J2 test data & clock (accept test data and clock from the J2 connector, used in debug mode);
3: front panel SMAs (accept ECL differential data and clock from front panel SMA connectors).

For ETS mode 3 is used.

TTL mux: This sets the TTL mux state. The values that can be set are as follows:

0: off (turns of the TTL mux);
1: RS422 clock & data/front panel DB9 (accept RS422 clock and data via the front panel DB9);
2: J2 rs422 clock & data (accepts clock and data via the J2 connector);
3: test mezz clock & data (accept clock and data from the test mezz, used for debugging).

For ETS this is set to 0.

trailer: The defines the size and content of the trailer if attached to the frame as it is output to the RS card. The order is specified as written. The modes are as follows:

0: none (no trailer to be attached);
1: 2-byte quality (attaches a 2 byte quality annotation to the end of the frame);
2: 6-byte time code (attaches a 6-byte time code annotation to the end of the frame);
3: 10-byte quality + timecode (attaches a 2- byte quality annotation followed by a 8 byte time code annotation to the end of the frame).

For ETS this is set to 3.

PN decode: This instructs the card whether PN decoding has to be performed and if so how. The modes are as follows:

0: none (no decoding);
1: decode, include sync (perform decoding including the sync as a part of the frame);
2: decode, exclude sync (perform decoding excluding the sync as a part of the frame).

For ETS this is set to 0.

4.2.4.7 Reed-Solomon Card Setup

The following screens display the Reed-Solomon setup pages, Figures 4-13 & 4-14. The first page sets up the general information on the frame and the processing of the same, and the second page sets up the routing table for the card.

```
RS1                  RS SETUP              TUE OCT 01 20:24:34 1996
                     HRSCLN3 v2  'hr clean test 3'
-------------------------------------------------------------------------------

         GENERAL SETUP                        DECODER SETUP

    Frame length           1034           Block Detection      YES
    Interleave             4_             Block Correction     YES
    Codeword Length        255
    Frame Sync Length      4_             Header Detection     NO_
    Append Trailer?        YES            Header Correction    NO_
    Input Mode (B/W)?      WORDS
    Output Mode (B/W)?     WORDS

    Discard uncorrectables YES
    Discard unrouteables   YES
    Enable frame routing   YES




Use the RETURN key and arrow keys to move around the page.
Next-page ^V,F4,PF4
Prev-page ESC-V,F3,PF3                    Exit ^G,ESC-C,ESC-ESC
```

Figure 4-13. Reed-Solomon Setup Page 1 - Offline Mode of ETS VHS

The fields on the first page are defined as follows:

Frame Length: Since the source of frames is the Frame Synchronization Card subsystem, then the Frame Length is entered as the actual (i.e. without the frame synchronization pattern) frame (VCDU) length plus the annotation added by that subsystem. In this case it is 2 bytes of frame quality and 8-byte time stamp.

Header Detection & Correction: The Reed-Solomon (10,6) Header Error Detection and Correction function can be Enabled to Check for Errors ("Detection"), Enabled to Correct Errors ("Correction"), or Bypassed.

Block Detection & Correction: The R-S (255,223) Block Error checking and Correction function can be Enabled to Check for Errors ("Detection"), Enabled to Correct Errors ("Correction"), or Bypassed.

Codeword Length: The Codeword length has a range from 33-255 bytes. For the ETS VHS setup, set Codeword Length to 255.

Interleave Level: This sets the Interleave level. This can range from 1-8.

Frame Sync Length: This sets up the size of the frame synchronization pattern. For the ETS VHS it is 4.

Append Trailer: This generates a 32 byte Quality Annotation block.

Input Mode: This sets up the mode in which the data is input into the card, it can be either 'byte-wide' or 'word-wide'. For the ETS VHS it is set to 'words'.

Discard Unroutables: This rejects all unroutable Frames.

Discard Uncorrectables: This rejects all uncorrectable Frames.

Enable Frame Routing: This enables the frames to be routed according to the routing table set up in the second setup page for the RS card.

The second screen allows the user to set up the VCDU streams that are to be routed to the different ports. The ports that are accessible to the Service Processor Card are 1 through 5 and the specific ports is set up when the HRTB is setup. The second setup page also allows the user to route the annotated VCDU stream to the 'Trash' FIFO or to filter or discard selected frames. For example, in the screen shown, the Version 2 VCDUs from SCID42, VCID63 are not routed to any port and instead they are filtered out, hence the 'N' and 'F' after the 2.042.63 entry.

The fields in the second page are defined as follows:

SCID: This enables the user to specify the Spacecraft ID for the data being routed through the RS Card. Each specified VCID needs a SCID entry.

VCID: This field is to specify the VCID being routed through the card. Each VCID needs to be entered and routed.

Version: This field has to be specified for every VCID being routed through the RS card.

Ports: For the ETS HRS the port is specified according to the HRTB setup file. Each VCID being routed through to the Service Processor has to use the same port number.

```
RS1                    RS Routing Table Setup      TUE OCT 01 20:25:58 1996
 Version 2       Ports 0-5 0 (N=no port)              *Store entry
 SCID    0__     Filter(F) NO_                        *Delete entry
 VCID    0_      Trash(T)  NO_     *Clear all         *Default:      pN v1 T

  2.042.17 5
  2.042.18 5
  2.042.23 5
  2.042.30 5
  2.042.42 5
  2.042.41 5
  2.042.11 5
  2.042.63 N  F









Use the RETURN key and arrow keys to move around the page.
Next-page ^V,F4,PF4
Prev-page ESC-V,F3,PF3                    Exit ^G,ESC-C,ESC-ESC
```

Figure 4-14. Reed-Solomon Setup Page 2 - Offline Mode of ETS VHS

Filter: This is entered for any VCID that has to be filtered out from the routing. For example, if the user does not want the Idle VCDUs to go through to the Service Processor, then for the VCID 63 entry the port routing is set to 'N' (none) and the Filter is set to 'YES'

Trash: This is entered for any VCID that has to be trashed out from the routing. For example, if the user does not want the VCDUs from a specific VCID nn to go through to the Service Processor, then for the VCID nn entry the port routing is set to 'N' (none) and the Trash is set to 'YES'

***Store Entry:** Stores the entered values for each specified VCID

***Delete Entry:** Deletes the entered values for each specified VCID

***Clear All:** Clears the entered values for all the VCIDs

4.2.4.8 Service Processor Card Setup

The VCDUs that are routed from the Reed-Solomon Card are transferred across the HRTB into the Service Processor Card. The main Service Processor Card setup page is shown in Figure 4-15. In addition there are two more pages associated with the Service Processor Card, referred to as LZP Setup Pages, which are used to setup the Packet Processing for the Service Processor Card.

```
SV1                              SETUP              TUE OCT 01 20:26:52 1996
                      HRSCLN3 v2  'hr clean test 3'
------------------------------------------------------------------------------
raw frame length, bytes  1024_          Frame Error Control Word? NO_
frame sync pattern size 4               Operation Control Field?  NO_
FS trailer size 10                      Secondary header? YES length 9_
RS trailer size 32
output fill pattern   $C9               Delete bad packets? NO_
frame version number   2
packet version number  1                1=reject, 0=process
                                        1 frames: RS/CRC errs at session start
RS encoded? YES   RS decoded? YES       1 frames: wrong spacecraft id
RS interleave depth 4                   1 frames: wrong frame version
                                        1 packets: wrong packet version
1=delete frame, 0=reject frame
0 frames with invalid vcid              Passthrough frames? NO_
0 frames with CRC or RS errors or        yes= packet assembly disabled
    invalid 1st header pointer
1 long or short frames
0 flywheel frame, 1=del, 0=process

Use the RETURN key and arrow keys to move around the page.
Next-page ^V,F4,PF4
Prev-page ESC-V,F3,PF3                  Exit ^G,ESC-C,ESC-ESC
```

Figure 4-15. Service Processor Setup Page - Offline Mode of ETS VHS

The Service Processor setup fields are defined as follows:

Raw frame length, bytes: For ETS High Rate, the frame length is 1024 bytes.

Frame sync pattern size: The pattern size should be 4 bytes.

FS trailer size: Indicate the number of bytes to be included in the annotation field which the FEP would pass on to Service Processor regarding Frame Synchronization status. The selected size should be 2 or 10 bytes (if time code is appended).

RS trailer size: Indicate the number of bytes to be included in the annotation field which the FEP would pass on to Service Processor regarding RS decoding status. The selected size should be 32 bytes.

Output fill pattern: Selected value should be $C9.

Frame version number: For ETS, version 2 is selected.

Packet version number: For ETS, version 1 is selected.

RS encoded?: Specify YES.

RS decoded?: Specify YES.

RS interleave depth: For ETS, interleave depth of 4 is selected for frame size of 1024 bytes.

RS Header Encoding: For ETS, specify NO.

Insert Zone?: For ETS, specify NO.

Insert Length: For ETS, leave this field as 0.

Frame Error Control Word?: For ETS, specify NO

Operation Control Field?: For ETS, specify NO.

Secondary header: If secondary header is present and has to be verified, specify the length of 9 bytes.

There are various options to either delete or reject frames with certain errors. For example, in the first column, the user can specify to either delete (=1) or reject (=0) frames with the following error conditions:

_ frames with invalid vcid

_ frames with CRC or RS errors or invalid 1st header pointer

_ long or short frames

_ flywheel frame, 1=delete, 0=process

Delete bad packets?: Specify the required action by the Service Processor if bad packets are detected.

Similarly there are various options to either process or reject packets with errors or from frames with certain errors. For example, in the second column, the user can specify to either reject (=1) or process (=0) packets with the following error conditions:

_ frames: RS/CRC errs at session start

_ frames: wrong spacecraft id

_ frames: wrong frame version

_ packets: wrong packet version

Number of Sources: Value maintains a number of sources to be processed. A source is identified for processing by the Virtual Channel Identifier (VCID) and Application Process Identifier (APID).

Error tagging on: For ETS, specify NO.

Packet annotation: For ETS, specify NO.

Passthrough Frames?: For Path Service specify NO, for 'Trash Buffer VCDU Service' specify YES, which means that the Packet Assembly is disabled.

The two setup screens associated with Level Zero Processor setup (which is essentially sets up the Packet Processing on the Service Processor Card) are defined in the following paragraphs. Setup page 1 is displayed in Figure 4-16 and is defined as follows:

Segment Directory Label: This specifies the name of the segment directory to be entered in the LZP Segment Directory menu.

Download it?: Defines the default being used or user-defined

ground station: User-defined to identify the data set

session id: User-defined to identify the data set

orbit id: User-defined to identify the data set

mission start: User-defined to identify the data set

mission end: User-defined to identify the data set

*** <=:** As the statement implies, the user will position the cursor at this point and press <enter> to rebuild the catalog's source table for the newly entered segment directory.

```
LZP               SEGMENT DIRECTORY        TUE OCT 01 20:27:52 1996
                     HRSCLN3 v2  'hr clean test 3'
--------------------------------------------------------------------------------
Segment Directory Label: HRSOPR___

OPTIONAL FIELDS
Download it? (NO= use SD defaults)
NO_  ground station ______
NO_  session id 00000000
NO_  orbit id 0____
NO_  mission start (doy/yr) 145/1968
     mission end   (doy/yr) 365/1999

* <= Press here to rebuild this catalog's source table from the current
     Segment Directory.




Use the RETURN key and arrow keys to move around the page.
Next-page ^V,F4,PF4
Prev-page ESC-V,F3,PF3                  Exit ^G,ESC-C,ESC-ESC
```

Figure 4-16. LZP Setup Page 1 - Offline Mode of ETS VHS

Once the Segment Directory is loaded, which in the above screen is shown as HRSOPR, screen 2 of LZP setup for the Service Processor Card displays how the input frames will processed. The operator can make entries only on the 'Flags' field. The LZP setup page 2 referred to as the Segment Directory, is shown is Figure 4-17. Once entries are made, the routing table lists the frame VCID and its associated APID, and the required services on the Flags Column.

The routing table is set up with multiple columns. Each row represents an entry in the table, and each entry is identified by the left-most number of the row. The Number field represents the left-most number, and allows the operator to identify entries in the table. For example, the SDR

```
LZP                          SEGMENT DIRECTORY        TUE OCT 01 20:28:39 1996
                        HRSSIMCLN v2  'hr clean test 3'
-------------------------------------------------------------------------------
PAGE forward    PAGE back      N=Path V=VCDU C=VCA B=Bitstream E=Encapsulate
sourc spid apid vcidmask flags A=active R=real-time Q=quicklook P=playback
   1 00042 256  00020000 AN___            16 00042 324  00000000 AN___
   2 00042 257  00020000 AN___            17 00042 67   00000000 AN___
   3 00042 258  00020000 AN___            18 00042 68   00000000 AN___
   4 00042 259  00040000 AN___            19 00042 69   00000000 AN___
   5 00042 260  00040000 AN___            20 00042 11   00000800 AN___
   6 00042 261  00040000 AN___             0     0    0        0 _____
   7 00042 262  00800000 AN___             0     0    0        0 _____
   8 00042 263  00800000 AN___             0     0    0        0 _____
   9 00042 265  40000000 AN___             0     0    0        0 _____
  10 00042 266  40000000 AN___             0     0    0        0 _____
  11 00042 267  40000000 AN___             0     0    0        0 _____
  12 00042 320  00000000 AN___             0     0    0        0 _____
  13 00042 321  00000000 AN___             0     0    0        0 _____
  14 00042 322  00000000 AN___             0     0    0        0 _____
  15 00042 323  00000000 AN___             0     0    0        0 _____

Use the RETURN key and arrow keys to move around the page.
Next-page ^V,F4,PF4
Prev-page ESC-V,F3,PF3                  Exit ^G,ESC-C,ESC-ESC
```

Figure 4-17. LZP Setup Page 2 - Offline Mode of ETS VHS

displays the source number 5, and fills in SCID = 42, APID = 260, VCID = 17 (identified by the mask 00020000), and the Service Flags as A (=active) and N(=path service). The fields are defined as follows:

SOURCE: Lists the unique combination of SCID, VCID and APID as numbered sources. For example, source 1 is APID 256 from SCID 42 and VCID 17.

SCID: Defines frame Spacecraft Identifier of the entry made into that Number in the routing table. Provide the number in hexadecimal. For ETS project, the SCID is 42.

APID: Defines the Application Identifier of the instrument data source. Each instrument on the Spacecraft can have one or more experiments and each 'source' of data is given a unique APID.

flags: This describes the processing mode of the data stream. In CCSDS parlance it can be Path service, VCDU service, VCA service, Bit-Stream service, and so on. In addition the data may be processed either as Real-Time, Quicklook and/or Playback data. For ETS HRS, all the return-link data will be Playback and Quicklook processing modes.

VCID: Define bit mask for identified Virtual Channel Identifier. Only one VCID can be entered with each Number entry. The following table, Table 4-1, describes how the VCIDs are set using the masks:

Table 4-1. Routing Masks for LZP Setup Page 2

M1 Mask0	VCID	M1 Mask0	VCID	M1 Mask0	VCID	M1 Mask0	VCID
00000000 00000001	0	- 0 - 00000100	8	- 0 - 00010000	16	- 0 - 01000000	24
- 0 - 00000002	1	- 0 - 00000200	9	- 0 - 00020000	17	- 0 - 02000000	25
- 0 - 00000004	2	- 0 - 00000400	10	- 0 - 00040000	18	- 0 - 04000000	26
- 0 - 00000008	3	- 0 - 00000800	11	- 0 - 00080000	19	- 0 - 08000000	27
- 0 - 00000010	4	- 0 - 00001000	12	- 0 - 00100000	20	- 0 - 10000000	28
- 0 - 00000020	5	- 0 - 00002000	13	- 0 - 00200000	21	- 0 - 20000000	29
- 0 - 00000040	6	- 0 - 00004000	14	- 0 - 00400000	22	- 0 - 40000000	30
- 0 - 00000080	7	- 0 - 00008000	15	- 0 - 00800000	23	- 0 - 80000000	31
Mask1 M0	VCID	Mask1 M0	VCID	Mask1 M0	VCID	Mask1 M0	VCID
00000001 00000000	32	00000100 - 0 -	40	00010000 - 0 -	48	01000000 - 0 -	56
00000002 - 0 -	33	00000200 - 0 -	41	00020000 - 0 -	49	02000000 - 0 -	57
00000004 - 0 -	34	00000400 - 0 -	42	00040000 - 0 -	50	04000000 - 0 -	58
00000008 - 0 -	35	00000800 - 0 -	43	00080000 - 0 -	51	08000000 - 0 -	59
00000010 - 0 -	36	00001000 - 0 -	44	00100000 - 0 -	52	10000000 - 0 -	60
00000020 - 0 -	37	00002000 - 0 -	45	00200000 - 0 -	53	20000000 - 0 -	61
00000040 - 0 -	38	00004000 - 0 -	46	00400000 - 0 -	54	40000000 - 0 -	62
00000080 - 0 -	39	00008000 - 0 -	47	00800000 - 0 -	55	80000000 - 0 -	63

The ETS HRS Service Processor Card is configured for Level-Zero Processing through the segment directory entered in the first LZP setup screen. This segment directory need not be changed because it includes all the sources that will be tested in the ETS VHS. If this has to changed, then the user has to use a UNIX editor on the workstation to edit the *.sdr file.

The format of a *.sdr file is shown below in Figure 4-18. Since the LZP mode will be used to create data sets for ESO-AM1 specific APIDs and VCIDs, the default SDR that has been loaded, HRSOPR, contains all the specifications for the sources from EOS-AM1. However, the packet lengths may vary and the user may have to edit the HRSOPR.SDR file to enter the actual packet lengths.

The first set of entries in the .sdr file need not be changed as they refer to disk formats and processing parameters. The only entries that may be changed are those pertaining to the actual packet data. The information that deals with the APID, the packet length, the VCID masking and the type of path service to be performed.

```
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
    This setup is for ETS HRS data : hrscln3.cadu and hrsdrt2.cadu
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

LABEL           HRSCLN3
SZDATADISK      1335000         blocks
SZDATAREC       8               blocks
SZDATABLK       32768           bytes
SZANNODISK      91974           blocks
SZANNOREC       2               blocks
SZANNOBLK       2048            bytes
MAX_SESSIONS    20
MAX_SOURCES     256
MAX_SENSORS     128
BLKCRCLIMIT     10 1000        1:bad_units/1000 2:minimum total. (10=1%)
FRMCRCLIMIT     10 3000
REJTFLIMIT      10 1000
BADPKTLIMIT     10 25000
HALTENABLE      0
MISSION_START   1993 1      (Original Time)
MISSION_START   1968 145        (So no packet times are rejected)
MISSION_END     1999 365
DS_SOL_FILES    4 4 100         files. 1:primedrive 2:backdrive 3:level
PKTANNOTATION   1               0=none 1=annotate all packets
PRIMARY_RANGE   100             packets
SECONDARY_RANGE 128             packets

  ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
  define sources. This section must follow the MAX_SOURCES definition.
  MAX_SOURCES must be 1 greater than the number of source definitions.
  Separate fields with spaces.
  Flags:T=timecode present, C=CCSCS timecode, A=active, V=variable
  length, Q=quicklook, R=real-time, P=playback, v=VCDU, c=VCA
  n=path(default), e=encap b=bit, spds=sessions per data set

SOURCE DEF
                              pkt           seq age
 apid  vcid1    vcid0   s/c len  flags    inc ncy   sensor       spds
256   00000000 00020000 002 0332  TAC        1   1 IN17-256      1
257   00000000 00020000 002 0340  TAC        1   1 IN17-257      1
.............................................................
.............................................................
324   00000200 00000000 002 0572  TAC        1   1 IN41-324      1
67    00000400 00000000 002 0642  TAC        1   1 IN42-67       1
68    00000400 00000000 002 0642  TAC        1   1 IN42-68       1
69    00000400 00000000 002 0276  TAC        1   1 IN42-69       1
11    00000000 00000800 002 0064  TAC        1   1 IN11-11       1
```

Figure 4-18. SDR File for LZP Setup Page 2 - Offline Mode of ETS VHS

4.2.4.9 High Rate Telemetry Backplane Setup

This set-up page, Figure 4-19, only permits the user to enter path and name of the HRTB configuration file. The file itself is configured using the tool, 'tbptool', residing on the Reed-Solomon Card. In the operational environment this configuration file will not be changed, and the default configuration file will be pre-loaded in the system.

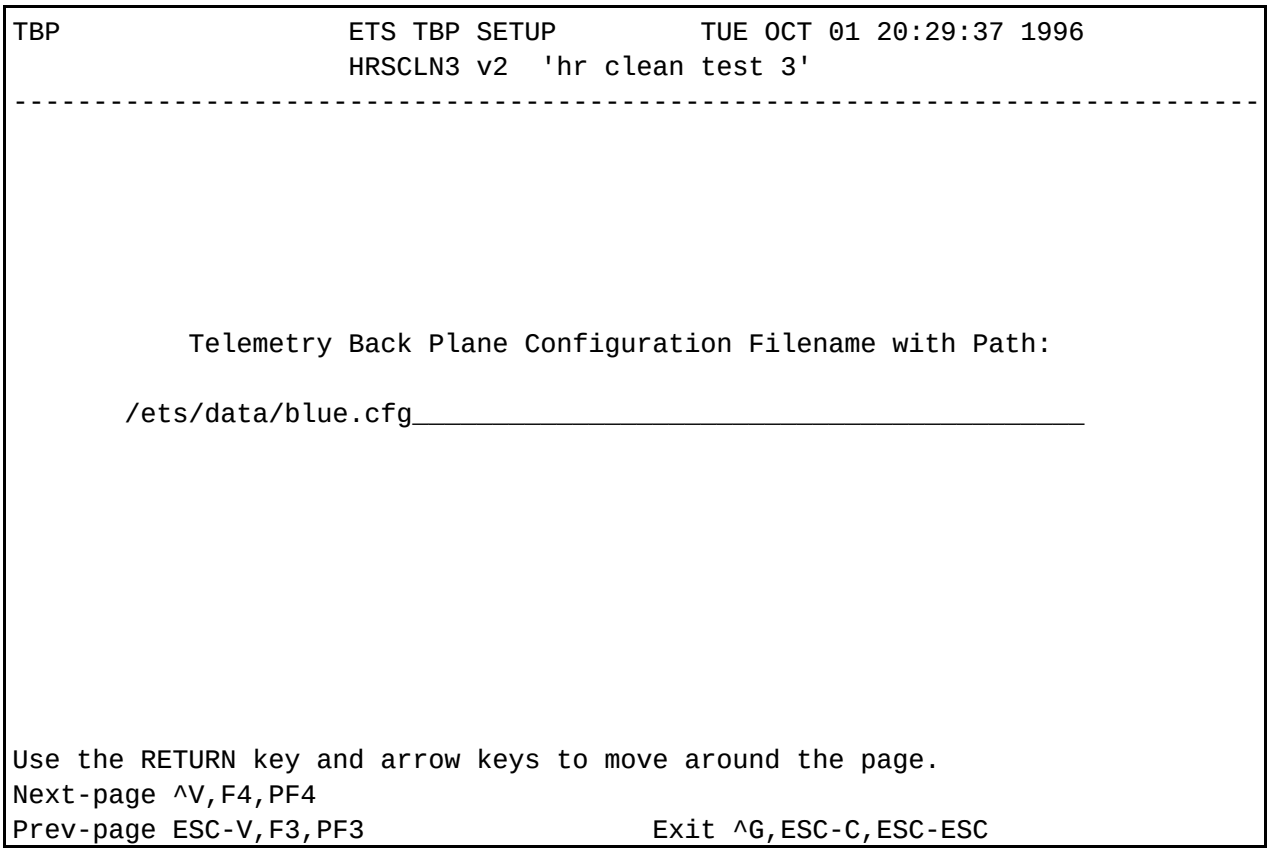


Figure 4-19. TBP Setup Page - Offline Mode of ETS VHS

4.2.4.10 Activate Catalog:

Finally, after all the edits are complete, the menu for exiting is displayed by typing in '^G' or the keys 'Esc-Esc'. The screen, shown in Figure 4-20, allows the user to save the catalog with a brief description and version number. From this menu it is possible to continue editing to modify certain setups and save the catalog under a different name or as a different version.

Once the user leaves the Edit mode, the next step is to activate the catalog. This is achieved by selecting the 'Activate' option at the bottom of the OPMAN screen. The user is prompted for a catalog name to be activated, or as a default the catalog in memory will be activated. The catalog in memory is the last catalog that was saved. The activate command is actually made up of two commands. The system first loads up the processing parameters, and if the Simulator Card is used as the data source, the base file on the Simulator Card memory. When the catalog is loaded, the activate command enables the catalog, thereby starting the data flow through the system.

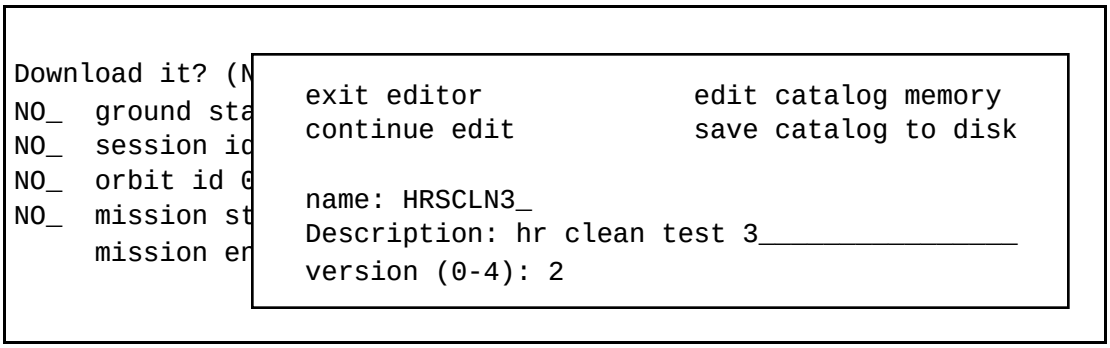


Figure 4-20. Options when exiting from the Edit Mode

4.2.4.11 Frame Synchronizer Status Page

When the catalog is running, the data processing is monitored by displaying the different status pages for the active cards. Two screens are associated with FS Card status. The FS Status Page 1 , Figure 4-21, reflects a detailed level of statistics in the FS card.

```
                        Frame Sync STATUS PAGE 1    TUE OCT 01 20:32:12 1996
-------------------------------------------------------------------------------
FS1 Catalog:                          Health: ok    [0    ]     Enabled? NO


state      SEARCH                        crc errors    0
search     1                             slip errors   0
check      0                             long slip     0
lock       0                             short slip    0
flywheel   0                             sync errors   0
back-to-   0
search

forward true       0                     reverse true        0
forward inverted   0                     reverse inverted    0
test output        0


 Page     Activate     Zero     Load      eNable      Commands     Flush
 Quit     Shutdown     Edit     Reset     Disable     dIrectory    Test
```

Figure 4-21. Frame Synchronizer Status Page 1 - Offline Mode of ETS VHS

The FS Status page 1 fields are defined as follows:

Catalog: Name of catalog that provided setup parameters for current data processing.

Health: Displays hardware status. The field reads either Ok, Good, Bad, Dead, or Booting. Booting indicates card-level hardware reset that is not yet complete. Bad indicates an error in FS Card processing. Usually, a Dead card requires a hardware reset before it is able to continue correct processing.

Enabled: Indicates whether or not card is ready to process data (enabled = ready).

state: Indicates the mode in which the card is at that instant of status update, i.e. whether it is in LOCKED, SEARCH, BACK-TO-SEARCH, CHECK or FLYWHEEL modes.

search: Field maintains a count of the frames processed in search mode. The number of frames processed in search mode is completely dependent on the setup of the card's search, check, and lock logic and the corresponding bit error tolerances. However, for the typical setup, if no errors occur in the input data, only one search frame is reported.

check: Field maintains a count of the frames processed in check mode. The number of frames processed in check mode is completely dependent on the setup of the card's search, check, and lock logic and the corresponding bit error tolerances. However, for the typical setup, and if no errors occur in the data, this value is between 0 and 15.

lock: Field maintains a count of the frames processed in lock mode. The number of frames processed in lock mode is completely dependent on the setup of the card's search, check, and lock logic and the corresponding bit error tolerances. However, if no errors occur in the input data, once the logic has moved into lock mode, it stays in lock mode. Therefore, for error-free data, once this value starts to increment, it should continue to increment without the Search Frames or Check Frames values incrementing.

flywheel: Value is the total number of flywheel frames detected. Flywheel frames are frames detected in lock mode with more bit errors than the set tolerance permits.

back-to-search: Value is the number of times that card switched from lock to search mode.

forward true: Value is the number of forward true frame sync patterns detected by the card.

forward inverted: Value is the number of forward inverted frame sync patterns detected by the card.

test output: This is used only when the FS is in used in a self test mode.

crc errors: Field displays number of detected frames with CRC errors. The field is applicable only if the card is set up to check CRC. If the card checks CRC values, it calculates a frame CRC based on the data input and compares it to the expected CRC value that is supplied in the frame trailer; if the two values do not match, a CRC error is recorded.

slip errors: Value is the number of frames processed with a long or short bit slip (frame was longer or shorter than expected length). If the FS Card is not set up with a slip tolerance, frames that are too long or too short are not detected. If a slip tolerance is set, the card can only detect bit slips (long or short) that are less than or equal to the set tolerance.

long slip: Value is the number of frames with a length longer than expected.

short slip: Value is the number of frames with a length shorter than expected.

sync errors: Field displays number of detected frames with synchronization pattern errors. If card is not set up with a frame synchronization pattern bit error tolerance, frames with a synchronization pattern error will not be detected. If a synchronization pattern bit error tolerance is set, the card can only detect frames with synchronization pattern bit errors less than or equal to the set tolerance.

reverse true: Value is the number of reverse true frame sync patterns detected by the card.

reverse inverted: Value is the number of reverse inverted frame sync patterns detected by the card.

The FS Status Page 2, Figure 4-22 reflects statistics of frame time stamping by the FS card. The time is specified in Julian days, hours, minutes, seconds and milliseconds. This time is extracted from the NASA 36 time code feed which is converted to PB5 for time stamping each frame. The time stamps for the first locked frame and the last frame before sync was lost are displayed. The modes of the time stamp are defined as follows:

Time Normal Polarity (acquired): This is the time in Julian days, hours, minutes, seconds and milliseconds when lock was acquired on the first frame received with normal polarity through the Frame Synchronizer card for a particular session.

Time Normal Polarity (lost): This is the time in Julian days, hours, minutes, seconds and milliseconds when lock was last lost on the normal polarity frame stream through the Frame Synchronizer card for a particular session. Lock can be reagined and thus this value is updated when lock is sunsequently lost by a frame later on in the frame stream.

Time Inverted Polarity (acquired): This is the time in Julian days, hours, minutes, seconds and milliseconds when lock was acquired on the first frame received with inverted polarity through the Frame Synchronizer card for a particular session.

Time Inverted Polarity (lost): This is the time in Julian days, hours, minutes, seconds and milliseconds when lock was last lost on the inverted polarity frame stream through the Frame Synchronizer card for a particular session. Lock can be reagined and thus this value is updated when lock is subsequently lost by a frame later on in the frame stream.

```
                        Frame Sync STATUS PAGE 2   TUE OCT 01 20:32:42 1996
------------------------------------------------------------------------------
FS1 Catalog:                          Health: ok    [0    ]     Enabled? NO

     Time Normal Polarity(acquired)      Time Inverted Polarity(acquired)
       Days 0                              Days 0
      Hours 0                             Hours 0
        Min 0                               Min 0
        Sec 0                               Sec 0
         ms 0                                ms 0
     Time Normal Polarity(lost)          Time Inverted Polarity(lost)
       Days 0                              Days 0
      Hours 0                             Hours 0
        Min 0                               Min 0
        Sec 0                               Sec 0
         ms 0                                ms 0
     Time Reverse Bit Order(acquired)    Time Reverse Bit Order(lost)
       Days 0        Sec 0                 Days 0        Sec 0
      Hours 0         ms 0                 Hours 0         ms 0
        Min 0                               Min 0


 Page     Activate     Zero     Load      eNable      Commands     Flush
 Quit     Shutdown     Edit     Reset     Disable     dIrectory    Test
```

Figure 4-22. Frame Synchronizer Status Page 2 - Offline Mode of ETS VHS

Time Reverse Bit Order (acquired): This is the time in Julian days, hours, minutes, seconds and milliseconds when lock was acquired on the first frame received in reverse bit-order through the Frame Synchronizer card for a particular session.

Time Reverse Bit Order (lost): This is the time in Julian days, hours, minutes, seconds and milliseconds when lock was last lost on the frame stream received in reverse bit-order through the Frame Synchronizer card for a particular session. Lock can be reagined and thus this value is updated when lock is subsequently lost by a frame later on in the frame stream.

4.2.4.12 Reed-Solomon Status Page

The frames from the Frame Synchronizer card are passed through to the Reed-Solomon card. The Reed-Solomon Status Page, Figure 4-23 reflects a detailed level of statistics on the RS card.

Input Frames: Displays the number of frames that have been input into the card from the Frame Synchronizer.

Frames Output to: Displays the number of frames that are distributed via the following output ports on the RS card. For the ETS HRS system only one port will be selected to correspond to the input port on the Service Processor card as set-up by the High Rate Telemetry Backplane Card.

Port 5: The count of frames output on Port '5' on the HRTB.

```
                              RS STATUS           TUE OCT 01 20:33:14 1996
------------------------------------------------------------------------------
RS1 Catalog:                              Health: ok    [0    ]     Enabled? NO


   Interleave Level:   1    Block Detection:  NO     Header Detection:  NO
   Output Framelength: 1    Block Correction: NO     Header Correction: NO
   Frame Routing:     NO    Data Input Size:  BYTES  Data Output Size:  BYTES
 =====INPUT/OUTPUT INFO=================++===========ERROR INFORMATION===
  Input Frames            0           ||  Long Frames              0
  Frames Output To:                   ||  Short Frames             0
    Port 5                0           ||  Correctable Frames       0
    Port 4                0           ||  Uncorrectable Frames     0
    Port 3                0           ||  Unrouteable Frames       0
    Port 2                0           ||  Correctable Headers      0
    Port 1                0           ||  Uncorrectable Headers    0
    Port 0                0           ||  Correctable Codewords    0
    Trash Buffer          0           ||  Uncorrectable Codewords  0
    Tape Drive            0           ||  Block Errors             0
    Quality Reject Buffer 0           ||  Header Errors            0
  Filtered Frames         0           ||  Bit Errors               0

 Page     Activate     Zero     Load      eNable      Commands     Flush
 Quit     Shutdown     Edit     Reset     Disable     dIrectory    Test
```

Figure 4-23. Reed-Solomon Status Page - Offline Mode of ETS VHS

Port 4: The count of frames output on Port '4' on the HRTB.

Port 3: The count of frames output on Port '3' on the HRTB.

Port 2: The count of frames output on Port '2' on the HRTB.

Port 1: The count of frames output on Port '1' on the HRTB.

Port 0: The count of frames output on Port '0' on the HRTB.

Trash Buffer: The count of frames routed to the Trash Buffer. Any frames can be routed to this buffer based on SCID and VCID combination. All rejected frames are also routed to this buffer. This buffer hold only 7 full 1024-byte frames that are discarded.

Tape Drive: The count of frames routed to the Tape Recording Subsystem for storage.

Quality Reject Buffer: The count of frames routed to the Quality Reject Buffer based on the uncorrectable and unrouteable status of the frames. This buffer hold only 7 full 1024-byte frames that are discarded.

Filtered Frames: The count of frames based on selected SCID and VCID combination are filtered out from the output stream and discarded.

Long Frames: Number of frames input to the Reed-Solomon Card that were longer than expected length. Expected length is defined in card setup.

Short Frames: Number of frames input to the Reed-Solomon Card that were shorter than expected length. Expected length is defined in card setup.

Filter Frm: Count of frames that the Reed-Solomon circuitry received as input, but did not output.

Correctable Frames: Count reports the number of frames in which the card detected errors, which were correctable.

Uncorrectable Frames: Count of frames that the Reed-Solomon circuitry detected errors which were not correctable.

Unrouteable Frames: Count of frames that the Reed-Solomon Card received as input frames, but could not output due to unrouteable errors.

Correctable Headers: Count reports number of frame headers with errors both detected and corrected by the card. More than one error can occur in the same frame header; therefore, this field does not reflect the number of header errors. For that value, refer to Header Errors field.

Uncorrectable Headers: Count reports number of frame headers with uncorrectable errors.

Correctable Codewords: Count reports number of codeword errors both detected and corrected by the Reed-Solomon Card. More than one error can occur in the same codeword; **NOTE**: Frames with interleave greater than one have more than one codeword.

Uncorrectable Codewords: Count reports number of codewords with uncorrectable errors.

Block Errors: Count reports number of frames block errors, where the block refers to the whole frame as opposed to the header only or data space only.

Header Errors: Count reports total number of frame header errors.

Bit Errors: Count reports total number of frame bit errors.

4.2.4.13 Service Processor Status Page

Four status screens are associated with Service Processor. The main SV Status Page, Figure 4-24, reflects high level processing of the card.

Fields for the main status field are defined as follows:

Catalog: System catalog name that was enabled when this status information was generated.

Health: Display status of hardware during operation. Field may read Ok, Good, Bad, Dead, or Booting.

Enabled: Indicate whether card is ready to process data (Yes/No).

Frame Information

Frames in: Value maintains a count of the number of frames recognized by the card.

Rejected: Value maintains a count of the number of rejected frames per annotated information from the FS. Packet processing can be performed by service processor.

```
                                STATUS              TUE OCT 01 20:33:37 1996
------------------------------------------------------------------------------
SV1 Catalog:                                Health: ok    [0    ]     Enabled? NO

hp:
op:
        in progress NO              direction F              session 00000000

   FRAME INFORMATION          PACKET INFORMATION       PIECE INFORMATION
   frames in   0              packets   0              rej/del      0
   rejected    0              realtime  0              bad appid    0
   deleted     0              bad out   0              bad length   0
   idle        0              deleted   0              no header    0
   bad spid    0              idle      0              bad time     0
   wrong ver   0              rs corr   0
   vcid off    0              short     0
   bad fhp     0              crc errs  0              OUTPUT
   bad length  0              rs errs   0              records      0
   vc breaks   0              bad spid  0              TC blocks    0
   start errs  0              bad vers  0              annotation   0


 Page     Activate     Zero     Load      eNable      Commands     Flush
 Quit     Shutdown     Edit     Reset     Disable     dIrectory    Test
```

Figure 4-24. Service Processor Generat Status Page - Offline Mode of ETS VHS

Deleted: Value maintains a count of the number of deleted frames per annotated information from the FS. Packet processing will not be performed by service processor.

Idle: Value maintains a count of the number of idle frames recognized by the FS card.

Bad SPID: Value maintains a count of the number of frames having bad Spacecraft ID.

Wrong Ver: Value maintains a count of the number of frames having wrong version number. For ETS project, frames with version 2 are valid.

VCID Off: Value maintains a count of the number of frames whose VCID is not identified in the processing catalog.

Bad FHP: Value maintains a count of the number of frames having bad first header pointer.

Bad Length: Value maintains a count of the number of frames that are in wrong length.

VC Breaks: Value maintains a count of the number of frames whose sequence counts are not contiguous.

Start Errs: Value maintains a count of frames whose starting sequence counts are not as expected.

Packet Information

Packets: Value maintains a count of the number of valid packets recognized by the card.

Realtime: Value maintains a count of the number of realtime packets recognized by the card.

Bad Out: Value maintains a count of the number of packets recognized by the card as having invalid parameters.

Deleted: Value maintains a count of the number of packets deleted from the output queue.

RS Corr: Value maintains a count of the number of packets recognized by the RS card .

Short: Number of packets that were shorter than expected length. Expected length is defined in card setup.

CRC Errs: Number of packets that were embedded in frames with CRC errors.

RS Errs: Number of packets that were embedded in frames with RS errors.

Bad SPID: Number of packets that were embedded in frames with bad S/C ID.

Bad Vers: Number of packets that have wrong version numbers.

Piece Information

Rej/Del: Number of packets that have been rejected or deleted by the card.

Bad APPID: Number of packets that have invalid Application Process ID.

Bad Length: Number of packets that were either shorter or longer than expected length. Expected length is defined in card setup.

No Header: Number of packets that cannot be recognized by the card.

Bad Time: Number of packets that have invalid time fields.

Output

Records: Value maintains the number of records being transferred via direct memory access (DMA).

TC Blocks: Not used for ETS.

Annotation: Not used for ETS.

Fields for the SV VC summary page, Figure 4-25, are defined as follows:

Catalog: System catalog name that was enabled when this status information was generated.

Health: Displays status of hardware during operation. Field may read Ok, Good, Bad, Dead, or Booting.

Enabled: Indicates whether card is ready to process data (Yes/No).

```
                              VC SUMMARY          TUE OCT 01 20:34:12 1996
------------------------------------------------------------------------------
SV1 Catalog:                                Health: ok    [0    ]     Enabled? NO


        vc#1     vc#2     vc#3     vc#4     vc#5     vc#6     vc#7     vc#8
frames  0        0        0        0        0        0        0        0
reject  0        0        0        0        0        0        0        0
delete  0        0        0        0        0        0        0        0
idle    0        0        0        0        0        0        0        0
crc     0        0        0        0        0        0        0        0
gaps    0        0        0        0        0        0        0        0
missing 0        0        0        0        0        0        0        0
rs-corr 0        0        0        0        0        0        0        0
rs-unc  0        0        0        0        0        0        0        0
idle-pk 0        0        0        0        0        0        0        0
bitstrm 0        0        0        0        0        0        0        0
vca     0        0        0        0        0        0        0        0
vcdu    0        0        0        0        0        0        0        0

totals: frames 0           packets 0           rejected-frames: 0

 Page     Activate     Zero     Load     eNable     Commands     Flush
 Quit     Shutdown     Edit     Reset    Disable    dIrectory    Test
```

Figure 4-25. Service Processor VC Summary Status Page - Offline Mode of ETS VHS

Frames: Value indicates the number of frames that are assigned with the associated VCID.

Reject: Value indicates the number of frames with the associated VCID that were rejected.

Delete: Value indicates the number of frames with the associated VCID that were deleted.

Idle: Value indicates the number of idle frames.

CRC: Value indicates the number of frames with the associated VCID that were detected with CRC errors. Not used for ETS HRS.

Gaps: Value indicates the number of gaps associated the VCID detected.

Missing: Value indicates the number of frames that are missing with the associated VCID. Note, this value will not be an accurate measure of the number missing if the sequence number rolls over, i.e. 65,536. Not used for ETS HRS.

RS-corr: : Count reports the number of frames in which the card detected errors, which were correctable.

RS-unc: Count of frames that the Reed-Solomon card detected errors which were not correctable.

RS-csym: Count of code word symbols that the Reed-Solomon card was able to correct.

Idle-pk: Count of idle packets within the VCID stream. Not used in ETS HRS.

VCDU: Count of Virtual Channel Data Units from specified VCID, used for VCDU service. Not used in ETS HRS.

VCA: Count of Virtual Channel Access Units from specified VCID, used for VCA service. Not used in ETS HRS..

Bitstrm: Count of Bit-Stream Units from specified VCID Not used in ETS HRS.

Fields for the SV source summary page, Figure 4-26, are defined as follows:

Catalog: System catalog name that was enabled when this status information was generated.

Health: Displays status of hardware during operation. Field may read Ok, Good, Bad, Dead, or Booting.

Enabled: Indicates whether card is ready to process data (Yes/No).

Index: Value should match with number of items setup in the processing catalog.

VC-VC: Identify the VCID associated with each index.

APID: Value should match with number of items setup in the processing catalog.

Packets: Value maintains the number of packets processed for each pair of VCID and APID.

CRC/RS-err: Value maintains the number of packets from frames that have CRC/RS errors.

Padded: Value maintains the number of packets that required padding.

Deleted: Value maintains the number of packets that have been deleted during the session.

```
                              SOURCE SUMMARY      TUE OCT 01 20:34:34 1996
-------------------------------------------------------------------------------
SV1 Catalog:                                Health: ok    [0    ]     Enabled? NO


     vc-vc apid packets    crc/rs-err padded    deleted    Selected Overall
0001 17-17 256  0          0          0          0         XP Counts:
0002 17-17 257  0          0          0          0
0003 17-17 258  0          0          0          0         packets  0
0004 18-18 259  0          0          0          0         frames   0
0005 18-18 260  0          0          0          0         rejected
0006 18-18 261  0          0          0          0         frames   0
0007 23-23 262  0          0          0          0
0008 23-23 263  0          0          0          0
0009 30-30 265  0          0          0          0
0010 30-30 266  0          0          0          0
0011 30-30 267  0          0          0          0
0012 41-41 320  0          0          0          0
0013 41-41 321  0          0          0          0
0014 41-41 322  0          0          0          0


 Page      Activate      Zero      Load      eNable      Commands      Flush
 Quit      Shutdown      Edit      Reset     Disable     dIrectory     Test
```

Figure 4-26. Service Processor Source Summary Status Page - Offline Mode of ETS VHS

4.2.4.13 LZP Status Page

Fields for the LZP status page, Figure 4-27, reflect the general status of the ETS VHS during a level zero processing session. It should be noted that this page gives an overall status of all the cards. The fields are defined as follows:

(FS) nascom blocks: Count of Nascom Blocks input into the FS card. Not used for ETS HRS.

(FS) frames received: Count of CCSDS Frames input into the FS card.

(FS) CRC error frames: Count of CCSDS Frames detected with CRC errors by the FS card.

(RS) RS uncorrectables: Count of CCSDS Frames detected with RS uncorrectable errors by the RS card.

(XP) rejected frames: Count of CCSDS Frames rejected by the SV card.

(XP) deleted frames: Count of CCSDS Frames deleted by the SV card.

(XP) vcid breaks: Count of VCID breaks detected within the data stream by the SV card.

(XP) packets output: Count of all the packets processed by the SV card.

(XP) realtime packets: Count of real-time packets processed by the SV card.

(XP) error packets output: Count of error packets detected and output by the SV card.

```
                                LZP STATUS          TUE OCT 01 20:35:19 1996
-------------------------------------------------------------------------------

session id     00000000                 (FS) nascom blocks      0
orbit id       0                        (FS) frames received    1
ground station                          (FS) CRC error frames   0
                                        (RS) RS uncorrectables  0
current time 275 20:35:18               (XP) rejected frames    0
                                        (XP) deleted frames     0
                                        (XP) vcid breaks        0
time since   00:00:00
acquisition                             (XP) packets output     0
                                        (XP) realtime packets   0
catalog                                 (XP) error pkts output  0
active vcids   7                        (XP) deleted packets    0
active sources 20                       (AP) missing packets    0
direction F
AP state  sleeping                      (AP) datasets (session) 0
                                        (AP) datasets (total)   0



 Page     Activate     Zero     Load      eNable      Commands     Flush
 Quit     Shutdown     Edit     Reset     Disable     dIrectory    Test
```

Figure 4-27. LZP General Summary Status Page - Offline Mode of ETS VHS

(XP) deleted packets: Count of packets deleted by the SV card.

(XP) missing packets: Count of missing packets detected by the SV card.

(AP) datasets(session): Count of data sets processed by the AP card during the session.

(AP) datasets(total): Count of total number data sets processed by the AP card during the one or more sessions.

4.2.4.14 Annotation Processor Status Page

Once a processing session is complete, i.e. this means when all the CADUs have been processed by the Service Processor, the 'Shutdown' command is implemented. This starts off the back-end or level-zero processing procedures. The Annotation Processor uses the annotation and timecode information generated by the Service Processor to create Packet Assembly Table (PAT) files for each APID. These PAT files are stored on the system disk by the Master Controller. The Annotation Processor Status Page, figure 4-28, contains fields that reflect the status of the annotation

processing for the data set processing function defined in the following paragraphs. It should be noted that only fields specified for the ETS project will be updated:

AP State: is the current activity and consists of:

SLEEPING (inactive)
HALTED (suspended by operator)
SESSIONS (processing a session)
TIMESPAN (generating a timespan data set)
PURGING (purging obsolete data set files)

```
                              AP Status           TUE OCT 01 20:37:04 1996
------------------------------------------------------------------------------
AP State sleeping        Session Status: session id 00000000 sources left 0
                              pat file
 purging 00000000           custom file


          Per Session Counts                Cumulative Counts
           production ds    0                 production ds    0
           custom ds        0                 custom ds        0
           quicklook ds     0                 quicklook ds     0
           packet reject    0                 packet reject    0
           frame reject     0                 frame reject     0
           missing packets  0                 missing packets  0
           anno records     0                 anno records     0
           timecode records 0                 timecode records 0




 Page      Activate      Zero      Load       eNable       Commands      Flush
 Quit      Shutdown      Edit      Reset      Disable      dIrectory     Test
```

Figure 4-28. Annotation Processor Status Page - Offline Mode of ETS VHS

Session Status: is the ID of the session currently being processed.

purging: is the ID of the session currently being purged.

PAT file: is the name of the PAT file for a specified data set (PDS or EDS) currently being processed.

custom file: is the name of the time-span data set currently being processed.

Per Session Counts:

production ds: of production data sets (PDS) generated this session.

custom ds: of custom (time-span) data sets generated this session.

quicklook ds: of quicklook data sets (EDS) generated this session.

packet reject: of rejected-packet data sets generated this session.

frame reject: of rejected-frame data sets generated this session.

missing packets: of missing packets this session.

anno records: of annotation records received from SV and stored to disk this session.

timecode records: of timecode records received from service processor and stored to disk this session.

Cumulative Counts:

production ds: of production data sets (PDS) generated.

custom ds: of custom (time-span) data sets generated.

quicklook ds: of quicklook data sets (EDS) generated.

packet reject: of rejected-packet data sets generated.

frame reject: of rejected-frame data sets generated.

missing packets: of missing packets.

anno records: of annotation records received from SV and stored to disk.

timecode records: of timecode records received from service processor and stored to disk.

4.2.4.15 High Rate Telemetry Backplane Status Page

The HRTB Status Page, shown in Figure 4-29, indicates the configuration of Telemetry Backplane. The "S" symbol indicates the source of data flow. The "I" symbol indicates the destination or data sink (input). The ">>" symbol indicates the flow of data from left to right.

The HRTB fields are defined as follows:

Catalog: System catalog name that was enabled when this status information was generated.

Health: Displays status of hardware during operation. Field may read Ok, Good, Bad, Dead, or Booting.

Enabled: Indicates whether TBP is set to transmit data (Yes/No) from source to sink.

Channel: Indicate the port or channel number associated with the output port of FEP card.

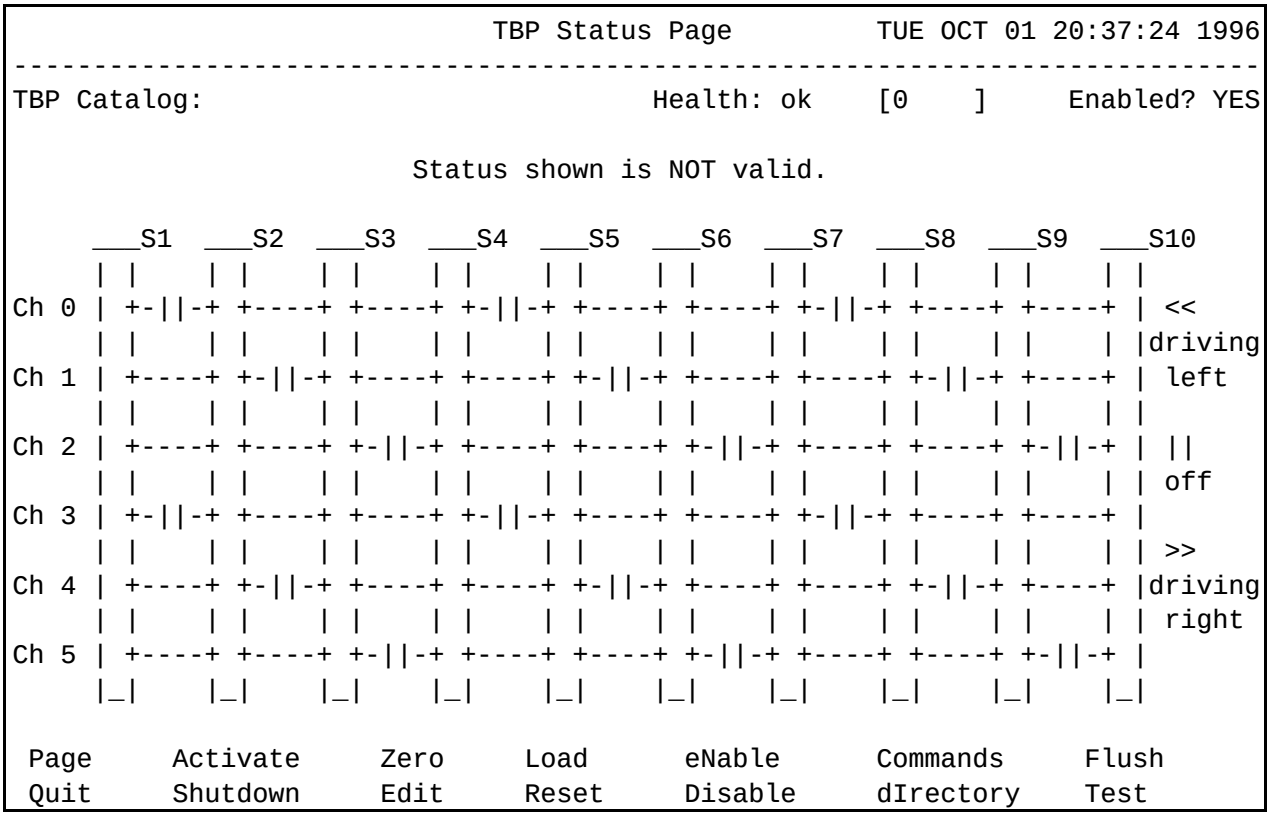


Figure 4-29. HRTB Status Page - Offline Mode of ETS VHS

S1-S10: Identify the slot number where each card is plugged into the bus. The identified slots for source and sink should reflect the actual plug-in configuration.

4.2.4.16 Data Set Generation and Distribution

Once all the PAT files have been created, the data sets have to be created. The Commands menu is brought up from any page on OPMAN. Essentially this allows the user to perform special commands on selected cards. The Data Set Distribution command selection brings up the overlaid menu as shown in Figure 4-30, which enables the LZP Data Set Generation capability.

At this stage the Ciprico Disk Array contains all the sorted packets from the LZP session, and the PAT file listing is on the MC system disk. When the Data Set Processor is given the name of the PAT file for a selected APID and commanded to send the data set, it uses the instructions outlined in the PAT file to correctly assemble and order the packets pertaining to that APID, create the data set and construction record for the same and send them to the target host

The PAT file is selected from the listing displayed using the 'browse' command. The host name of the CDS is entered as the target host with the appropriate directory, user name, account and password, since the CDS is only used as a temporary storage of the created data set enroute to the SONY tape media. Once all the data sets have been created and transferred via the CDS to the TRS SONY tape media, the LZP data set generation procedure is deemed as complete, and the data on the Ciprico disk array may be written over.

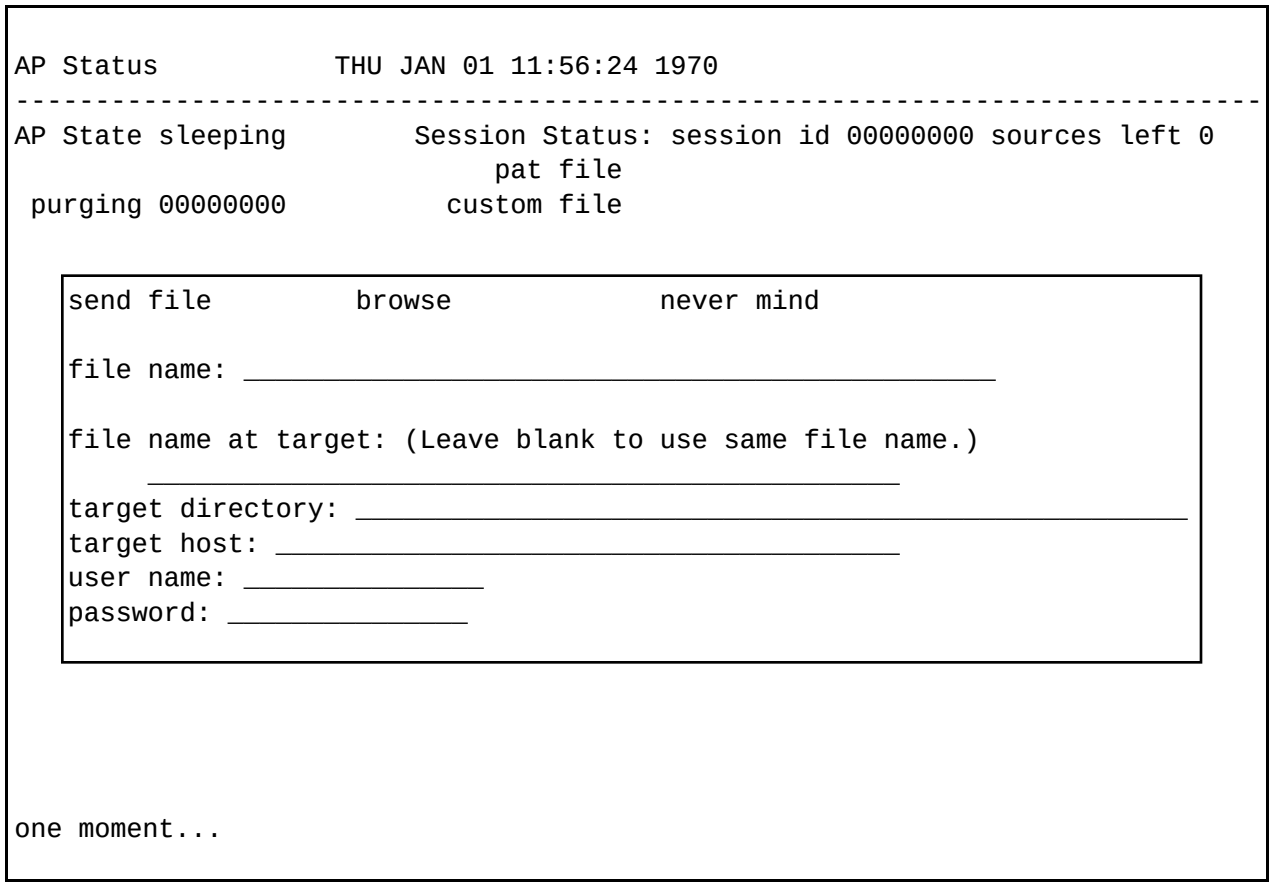


Figure 4-30. Data Set Distribution Commands Page - Offline Mode of ETS VHS

The fields in the Data Set Distribution Commands Page are defined as follows:

browse: This command will display the list of PAT files on the Master Controller System Disk

filename: Any filename selected on the system disk when clicked on will appear in this field entry. The PAT files are named in the same format as the PDSs and EDSs, but with a .INF extension.

file name at target: This field can be kept blank or filled in to accept a new name for the data set that is to be generated from the selected PAT file.

target directory: The target directory on the CDS workstation will be entered here.

target host: The name of the CDS has to be entered here as the host.

user name: The user who initiates the transfer needs to have write permission on the directory selected, and as such the user name must be entered here.

password: The user password must be typed in here to enable writing in to the specified target directory. The password will not be displayed.

4.2.4.17 Data Set Transfer from CDS to ETS TRS SONY Tape Media

The transfer the LZP created data sets from the CDS to the ETS TRS SONY Tape media has to be carried out once two gigabytes or less in data sets have been transferred from the ETS VHS. Once these data have been transferred to the ETS TRS, then another set of files may be FTP'd to the CDS for subsequent transfer to the ETS TRS. The reason for restricting the amount of data sent to the CDS from the ETS VHS at any one instance is levied by the storage capacity of the local disk on the CDS. The sequence of steps for these transfers is described in the next section.

4.2.4.18 Data Set Transfer from ETS TRS SONY Tape Media to CDS

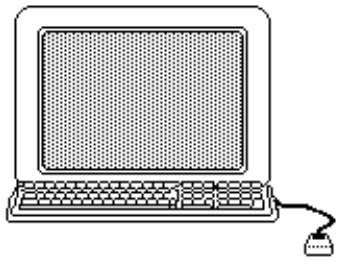
The transfer the LZP created data sets from the ETS TRS SONY Tape media to the CDS is also restricted to two gigabytes or less at a time. The sequence of steps for these transfers is described in the next section.

4.2.4.19 Data Set Transfer from CDS to the Ciprico Disk Array

Once two gigabytes or less have been transferred on to the local disk of the CDS, the FTP utility is invoked from the Menu Controller. The format and display of the utility are TBS. The sequence of steps to perform the FTP are as follows:

1. ftp
2. open vxetshi2-p7 21000
3. binary
4. mput /path/filename1*.*
5. ……..
6. mput /path/filenameN*.*

SECTION 5
ETS TRS SETUP & OPERATIONS



This section describes system setup, control, and status using the Code 521-developed ETS TRS operator's interface.

Procedures for operations via the TPCE interface, a GUI-based user interface, are detailed in a separate section/document.

5.1 ETS TRS OPERATIONAL OVERVIEW

The ETS TRS is used to playback a pre-recorded stream of serial CADU data at data rates up to 150 Mbps. This data stream is output via differential ECL outputs to simulate a TDRS Ground Terminal Return Link to EDOS. The pre-recorded CADU data can be either simulated data generated by SCTGEN or SCITF generated spacecraft data dubbed from Ampex tapes. The simulated data may be in the form of packets or CADUs, and may be modified by encapsulation into CADUs and/or injecting pre-specified errors in to the data stream. To perform these functions the following set-up procedures and operations have to be followed:

1. Invocation of the TRS Graphical User Interface from the TPCE main menu.

2. Selecting the function to be implemented.

3. Setting up the correct cable connections

4. Setting up the Clock Generator to output the pre-programmed clock frequency and levels. Implementing the selected function using the procedural steps outlined in this section.

5.2 INVOCATION OF ETS TRS GUI

From the TPCE main menu page, select the TRS from the pull-down menu. By default, the Graphical User Interface for the SONY tape recorder will appear. The ETS TRS GUI is shown in Figure 5-1.

The TRS GUI layout consists of the following:

The control toolbar: used to control the SONY tape recorder. These functions are rewind, play, fast-forward, stop, record, and eject.

The macro toolbar: used to invoke the following frequently used functions:

Lock Icon -	Lock up the system
DIR -	Show SONY tape directory
Display Icon -	Display Event window
AMPEX Icon -	Display AMPEX GUI
CSG Icon -	Display CSG GUI (to be implemented)
CLR Icon -	Reset SONY
? Icon -	Display Help Window

The event window: used to display a scrollable history of TRS commands

The command input line: used to accept commands to the TRS server.

Exec button icon: used to execute the command.

Figure 5-1. ETS TRS Graphical User Interface

5.3 ETS TRS MODES OF OPERATION

There are two modes of operation for ETS TRS, namely the Operations Mode, to simulate a return link CADU data stream at data rates up to 150 Mbps to EDOS via a 'playback' from the SONY tape; and the Off-Line Mode, to 'dub' SCITF generated Ampex tapes to SONY tapes, and act as a transfer media for the off-loading, storage, and staging of CADU test data and data sets.

5.3.1 ETS TRS OPERATIONS MODE - TRS RETURN LINK SIMULATION

In this mode the Return Link CADU Data Stream is simulated using the ETS TRS playback from the SONY tape drive. The SCTGEN created test data i.e. CADU data stream, is previously recorded onto the SONY tape using the TRS Graphical User Interface. From the ETS TRS GUI, select Show SONY tape directory to display the listing of the files on the SONY tape. The switch panel on the ETS TRS is set as follows:

1. Clock Generator Output to Triplex
2. SONY Data Output to External
3. SONY Clock Output to External

The Clock Signal Generator (CSG) is set manually to the programmed setting for the tape playback. This would entail pre-programmed ECL voltage levels of -0.5 High and -0.95 Low, with a duty cycle of 50%, and a rise and fall delay of 1 nanosecond. The data rate is user selectable, and the SONY playback is capable of a data rate in excess of 150 Mbps. When the software control for the CSG is implemented, the CSG will be set through the ETS TRS GUI. The following sequence of steps are followed to initiate a playback:

1. Push SONY Play button icon

Under 'Output To':

2. Select SIO
3. Enter filename
4. Start record (blank for beginning of file)
5. Total records (blank for all of file)
6. Push OK button icon

At this stage the SONY is now playing back data, and the data transfer may be monitored on the ETS TRS GUI. The playback will terminate once the required number of records have been transferred. To terminate the playback at any time:

1. Push SONY stop button icon

5.3.2 ETS TRS OFFLINE MODE - DUBBING FROM AMPEX TO SONY:

In this mode of operation, the SCITF generated spacecraft data is transferred from the Ampex tape media on which it is received on to the SONY tape media. It is from the SONY tape media that the TGT simulation for Return Link data will be implemented. From the ETS TRS GUI, macro toolbar, select Display AMPEX GUI, as shown in Figure 5-2, to access the Ampex menu page. The Ampex GUI is used to control the Ampex tape drive. The switch panel on the ETS TRS is set as follows:

1. Clock Generator Output to Ampex
2. Ampex Data Output to Triplex
3. Ampex Clock Output to Triplex

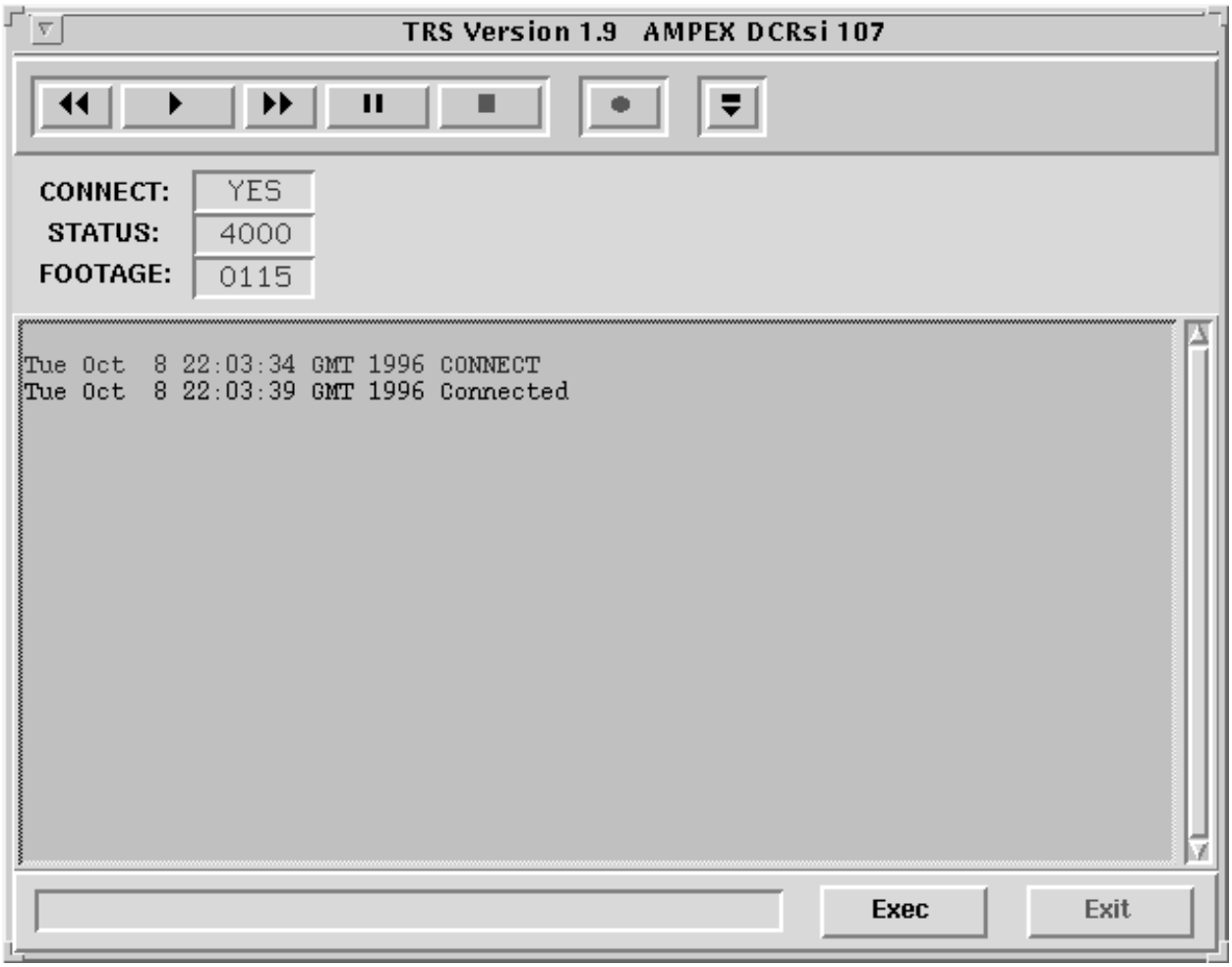


Figure 5-2. ETS TRS Ampex Menu Panel

The CSG is set manually to the programmed setting of ECL voltage levels of -0.5 High and -0.95 Low, with a duty cycle of 50% and a rise and fall time of 1 nanosecond. From the SONY main page the SONY tape drive is put in to a record mode using the following sequence of steps:

1. Push SONY record button icon

Under 'Record Data From', select Ampex

2. Select Record Mode: Append
3. Enter new filename, record size, total records (blank for no limit)
4. Push OK button

At this stage the SONY is now recording. Next from the AMPEX GUI main menu page the following sequence of steps put the Ampex tape drive in to a playback mode:

1. Push AMPEX play button icon
2. Enter start footage, and duration
3. Push OK button

At this stage the AMPEX is playing back data which is being recorded by the SONY. Once the dubbing is complete, the recording is terminated in the following manner:

1. Push SONY stop button icon
2. Push SONY Dir button to verify new file on tape

5.3.3 ETS TRS OFFLINE MODE - STAGING SCTGEN GENERATED CADU TEST DATA

The SCTGEN generated simulated CADU test data is generated on the CDS. The SONY tape media is selected as the output device for storing the CADU test data file. In the case of SCITF generated data, after it has been 'dubbed' from the Ampex tape media, the user may transfer the data on to the CDS to inject errors. In the case of SCITF generated packet data, the user may transfer these packet files on to the CDS for encapsulation in to CADUs by SCTGEN.

5.3.4 ETS TRS OFFLINE MODE - TRANSFERRING DATA SETS TO AND FROM THE CDS

Since there is a requirement to be able to store a session's worth of data sets, about 26 GB, for simulating a data set transfer session from ETS to EDOS, the generated data sets have to be stored offline until needed to run the data set transfer test session. These Data Sets are created either by SCTGEN or by the LZP capability on the ETS VHS. In the former option, the data sets are stored on the CDS local disk as they are generated and transferred one by one on to the SONY tape media. In the case of the LZP option, the data sets are generated on the ETS VHS rack and transferred over selectively by the user. Once again these data sets are transferred one by one on to the SONY tape media until needed.

When these data sets are needed, the reverse operation takes place and the data sets are transferred one by one from the SONY tape media on to the CDS local disk and subsequently FTP'd to the Ciprico Disk Array.

The File Transfer from the CDS to the Ciprico is implemented either by using the command line on the CDS terminal window, or by using the FTP utility invoked from the Menu Controller. The following paragraphs outline the sequence of steps to transfer the data sets to and from the SONY tape media.

5.3.4.1 Transfer From CDS to SONY Tape Media

The transfer of data set files from the CDS to the SONY tape media is via the network. In this case the transfer is via Ethernet and the data rate is dictated by the network. From the ETS TRS GUI, the following sequence of steps are followed:

1. Push record button icon
2. Enter fully qualified name of data set file on disk
3. Select Record Mode: Append
4. Enter new filename, record size, total records (blank for no limit)
5. Push OK button

At this stage the SONY is now recording a data set file from the CDS disk on which the file resides on to the SONY tape media. This is used to store the created data sets prior to a data set transfer session. When the data sets are ready for transfer, they are first transferred to the Ciprico Disk Array and staged for transfer via Ebnet to their destination.

5.3.4.2 Transfer From SONY Tape Media to CDS

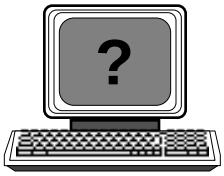
The transfer of data set files from the SONY tape media to the CDS is via the Ethernet interface. From the ETS TRS GUI, the following sequence of steps are followed:

1. Select SIO
2. Enter filename

3. Start record (blank for beginning of file)
4. Total records (blank for all of file)
5. Push OK button icon

At this stage the SONY is now playing a data set file from the SONY tape media on which the file resides on to the CDS local disk. This is used as a temporary store for the data sets prior to a data set transfer to the Ciprico Disk Array. When all the data sets are transferred to the Ciprico Disk Array, they are ready for the start of a data set transfer session via Ebnet to their destination.

SECTION 6
MAINTENANCE



This section provides maintenance information used to support the ETS HRS.

6.1 INTRODUCTION

This section overviews basic maintenance procedures, and safety precautions, required by the ETS HRS.

6.2 BASIC MAINTENANCE

6.2.1 WARNINGS

a. Always wear an anti-static grounding device when handling cards.

b. Follow proper grounding procedures when handling cards.

c. Only work at a static-free workstation.

d. Transport all cards in anti-static bags.

e. Ground yourself before touching hardware.

f. Do not vacuum clean the front panel or any boards with an ungrounded vacuum cleaner.

g. Always hold the Reset Switch up (on left-most card) while turning power off.

6.2.2 PROCEDURES

Perform the following activities on ETS VHS every 2 months, or as necessary:

a. Clean Air Filters: Remove and clean air filters. There is a chassis air filter located under the bottom chassis fan tray that is accessible by unscrewing the thumb screws and removing the front access panel that covers the bottom fan tray. Use compressed air to blow debris out, or wash it.

b. Fan Check: Check that fans are properly functioning. There are two sets of fans: a single top exhaust fan, and a set of push and pull exhaust fans on the top and bottom of the chassis. Use a flashlight or other light source to illuminate the rotating blades. Also, listen for squeaks or other noises that indicate bearing problems.

c. Remove Dust: Remove dust from the front panels. Using a cotton swab to remove dust accumulation from front-panel buttons, indicators, and terminal ports.

d. Clean Local Terminal (if applicable): Turn the terminal off before cleaning the terminal keyboard. Use a lint free cloth, dampened with terminal cleaning solution, and wipe off the CRT screen. Clean off any accumulated dust and dirt on the terminal screen and terminal keyboard. After cleaning, turn on the power to the terminal, wait until OK is displayed on the terminal screen, and then press ^X1 or ^X2 to refresh the terminal screen.

In the case of the ETS TRS system the procedures for maintenance are either covered under the maintenance agreement between the vendor and GSFC and in the listed user manuals for operations and maintenance.

SECTION 7
REFERENCE DOCUMENTATION

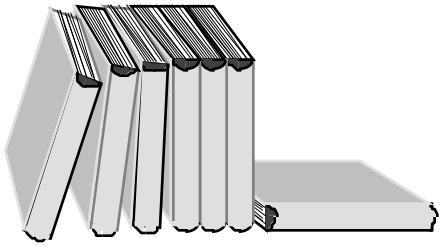


Table 7-1 lists the available documentation that supports the ETS HRS.

Table 7-1. ETS HRS Reference Documentation

Subject	Document Name	Date	Source
ETS HRS	ETS HRS System Requirements Document, ETS HRS Interface Control Document, 521-ICD- ETS HRS System Test Procedures, 521-STP- ETS HRS Detailed Design Specifications - Volume 3, 521-DDS-002 ETS HRS System Test Plan, 521-TP-	TBS TBS TBS TBS	Code 521/GSFC
Master Controller Card/Data Buffer Controller	MVME167 Single Board Computer Installation Guide	1992	Motorola
MEDS	MEDS User's Guide, Version 1.2, 521-MEDS-001 MEDS Programmer's Guide, Version 6.0, 521-MEDS-011 MEDS Interface Control Document, Version 1.2, 521-MEDS-007 MEDS Library Reference Manual, Version 1.2, 521-MEDS-009	1/92 5/94 1/92 4/92	Code 521/GSFC
EOS Simulator Card	EOS Simulator Hardware Definition Document, 521-H/W-051		Code 521/GSFC
EOS Frame Synchronizer Card	EOS Frame Synchronizer, Hardware Definition Document, 521-H/W-TBS	TBS	Code 521/GSFC
EOS Reed-Solomon Card	EOS Reed-Solomon, Hardware Definition Document, 521-H/W-TBS	TBS	Code 521/GSFC
EOS Service Processor Card	EOS Service Processor Card, Rev B, Hardware Definition Document Service Processor Card Software Definition Document	TBS TBS	GSFC/521 GSFC/521
Memory Card	MM-6390D User's Guide	1992	Micro Memory, Inc.
68040 CPU Mezzanine	68040 CPU Mezzanine HDD	1994	GSFC/521
Ciprico 6700 32 GB Disk Array	User's Manual	TBS	Ciprico
DATUM 9100 Time Code Generator	Operating Manual	TBS	Datum

Table 7-1. ETS HRS Reference Documentation (Cont'd)

Subject	Document Name	Date	Source
SONY DIR-1000 Tape Drive	DIR-1000 Users Manual, 1st Edition (Rev 3)	TBS	Sony
Ampex DCRsi-107 Tape Drive	Users Manual	TBS	Ampex
Hewlett-Packard HP 8130 Pulse (Clock) Generator	Operating and Programming Manual	TBS	Hewlett-Packard
Triplex TSC/STX Interface System	System Documentation	TBS	Triplex
TPCE (Separate Document)	ETS HRS User's Guide, Release, DSTL-96-	TBS	Code 522/GSFC
SCTGEN	Spacecraft Test Pattern Generator, Version xx, User' Guide, 521-S/W-		Code 521/GSFC
VxWorks	VxWorks Programmer' Guide, Version 5.1 VxWorks Reference Manual, Version 5.1 VxWorks Programmer' Guide, Version 5.2 VxWorks Reference Manual, Version 5.2	1993 1993 1994 1994	Wind River Systems

ACRONYMS AND ABBREVIATIONS

Term	Definition
ACE	Advanced Composition Explorer
AM	Amplitude Modulated
AOS	Advanced Orbiting Systems
BaSE	Base System Environment
BOB	Break Out Board
CCB	Configuration Control Board
CCSDS	Consultative Committee for Space Data Systems
CLTU	Command Link Transmission Unit
CPU	Central Processing Unit
CRC	Cyclical Redundancy Check
CTS	Clear to Send
DB	Data Buffer
DCN	Documentation Change Notice
DSN	Deep Space Network
ECL	Emitter Coupled Logic
FDDI	Fiber Distributed Data Interface
FIFO	First-in, First-out
FLIC	Forward Link Interface Card
GSE	Ground Support Equipment
GSFC	Goddard Space Flight Center
GVCID	Global Virtual Channel Identifier
IF	Interface
I/O	Input/Output
IP	Internet Protocol
LAN	Local Area Network
LED	Light-emitting Diode
MCC	Master Controller Card
MEDS	Modular Environment for Data Systems
MSFC	Marshall Space Flight center
Nascom	NASA Communications
NCO	Numerically Controlled Oscillator
NTLM	Nontelemetry
OPMAN	Operations Manager
P/N	Pseudonoise
RD	Receive Data
RF	Radio Frequency
RTS	Request to Send
SBC	Single Board Computer
SCID	Spacecraft Identifier
SCSI	Small Computer System Interface
SFDU	Spacecraft Data Unit
SOSDU	Space Operations Service Data Unit
TCP/IP	Transmission Control Protocol/Internet Protocol
TD	Transmit Data
TLM	Telemetry
TPCE	Telemetry Processing Control Environment
TPGEN	Test Pattern Generator
TTL	Transistor-to-Transistor Logic
UPS	Uninterruptable Power Supply
VCDU	Virtual Channel Data Unit
VCID	Virtual Channel Identifier
VLSI	Very Large Scale Integration
VMEbus	Versa Module Eurocard bus

APPENDIX A
BOOT CONFIGURATION

A.1 CHANGING THE IP ADDRESSES

NOTE: The ETS HRS requires nine *contiguous* IP addresses to boot correctly. The group of HRS IP addresses is as follows: TBS (inclusive) when the HRS is to be installed in Building 32.

A.1.1 REASONS IP ADDRESSES MAY CHANGE

IP addresses may change for one of the following reasons:

a. Moving the ETS HRS to a new lab, causing it to be on a different network, requiring new IP addresses.

b. Deciding the current addresses are needed for some other systems so new addresses are assigned to the ETS HRS telemetry system.

A.1.2 WHAT TO DO WITH NEW IP ADDRESSES

Once new addresses are established, complete the following:

a. From the prompt on the Master Controller Card type **bootChange** to change the current booting configuration of the ETS HRS.

b. Press **Return** until the following is displayed:

inet on ethernet (e) : **xxx.xxx.xxx.xxx**:ffff0000 (**NETMASK**)

c. This address will be replaced with the new address. This new address will be the first address in the block of TBS new IP addresses. A *netmask* must be entered if the ETS HRS is no longer on its own secured network with a single workstation. If the netmask for the network is unknown, ask the system administrator.

4. Reboot the ETS HRS.

NOTE: All other subsystem IP addresses will be changed automatically according to the new IP address entered above. That is why the **new IP addresses *must* be contiguous**.

IP addresses for the subsystem cards are downloaded from the Master Controller Card to the subsystems. This is accomplished via a boot script that loads the information directly into non-volatile memory on the individual subsystems. The function that performs this task is called load_bl(), which is part of a start-up script called **bootline.cmd**, found in the **boot_scripts** directory under the current release of the ETS HRS software.

To determine the IP address of a particular card, look at the load_bl() reference in bootline.cmd corresponding to that card. The first argument in the parameter list is the processor number chosen for that card. The corresponding IP number for that card is equal to that of the Master Controller Card, plus the processor number, plus one.

The parameters in the argument list are defined as follows: The first parameter is the processor number of the card. The second parameter is the base address of the card as seen by the Master Controller Card. The third parameter is the base address of shared memory as seen by the subsystem. The fourth parameter is the operating system image to be downloaded onto the card upon bootup. The last parameter is the startup script to be used to boot the card.

A.1.3 PROBLEMS THAT MAY OCCUR

A VxWorks error message may reference a Duplicate IP Address; that means one or more of the IP addresses being used by the ETS HRS are already allocated to other systems. Check the IP address entered above and verify that the TBS addresses following it are not already being used by other systems.

A.2 CHANGING THE HOST FROM WHICH THE SYSTEM BOOTS

A.2.1 REASONS HOSTS MAY CHANGE

Hosts may change for one of the following reasons:

a. The ETS HRS must boot from a new host due to network traffic.

b. The software has been moved; the system should boot from the host on which the software resides.

A.2.2 HOW TO CHANGE THE HOST FROM WHICH THE ETS HRS IS BOOTING

To change the host from which the ETS HRS is booting, complete the following:

a. From the prompt on the Master Controller Card, type **bootChange** to change the current booting configuration of the ETS HRS.

b. Press **Return** until the following is displayed:

host name : **xxxxxx**

c. Enter the new host name. Press **Return** again until the following is displayed:

host inet (h) : **xxx.xxx.xxx.xxx**

d. Enter the IP address of the new host from which ETS HRS will boot.

e. Edit the file "**etsh.cmd**" found in the "**boot_scripts**" directory of the ETS HRS software. Edit the following that are in bold:

cd "**host name:/ets/boot_scripts**"

rdate "**host name**"

f. Reboot the ETS HRS.

A.2.3 PROBLEMS THAT MAY OCCUR

A.2.3.1 Problem

The following problem on the Master Controller indicates an error:

```
Attaching network interface ln0...done
Attaching network interface lo0...done
Loading...
Error loading file: errno = 0x3d
Can't load boot file!

[VxWorks Boot]:
```

This may occur due to an invalid IP address for the host.

A.2.3.2 Solution

At this prompt, type **c** to change the configuration and press **Return** until the following is displayed:

host inet (h) : **xxx.xxx.xxx.xxx**

Verify the validity of this IP address. There may have just been a typing error. Otherwise, check with a system administrator to verify whether this is a valid IP address or if a different address for the host is necessary.

A.3 ETS HRS BOOTLINE COMMANDS

The ETS HRS has two modes for booting up. The Operations Mode or Big-Disk Mode and the Offline Mode or LZP Mode. These modes can be toggled from the GUI/OPMAN terminals. When in a specific mode, the resetting of the VHS rack using the reset button on the Master Controller, reboots the rack in the mode that it had been in, i.e. at the last toggle. The following paragraphs list the boot-scripts that may be edited and the bootline command scripts for the two modes of operation:

a. The following configuration files found in the "**ets/boot_scripts**" directory of the ETS HRS software may be edited:

```
ap1.cmd
bootline.cmd.lzp
bootline.cmd.bigdisk
dp1.cmd
ef1.cmd
etsh.cmd.lzp
etsh.cmd.bigdisk
etsh_nfs.cmd
fd1.cmd
fs1.cmd
lzp.cmd
mcmeds.cmd
re1.cmd
rs1.cmd
sv1.cmd
sx1.cmd
```

b. The bootline command for the LZP mode is listed in the following paragraphs:

```
# backplane network address
BP = 0x04000600

# Wait for slow cards to get going.
AP1 = 0x10000000
RE1 = 0x70000000
FD1 = 0x20000000

wait_no_buserr(AP1)
wait_no_buserr(RE1)
wait_boot_ack(AP1)
wait_boot_ack(RE1)

SX1 = 0xd0000000
sxkernel="/sd0/sub_systems/sx/bsp/vxWorks"
```

```
load_scsi(2,SX1,BP,sxkernel,"/sd0/boot_local/sx1.cmd")
wait_boot_ack(SX1)

FS1 = 0xd1000000
fskernel="/sd0/bsp/mz8130/vxWorks.a32"
load_scsi(3,FS1,BP,fskernel,"/sd0/boot_local/fs1.cmd")
wait_boot_ack(FS1)

RS1 = 0xd1800000
rskernel="/sd0/bsp/mz8130/vxWorks.a32"
load_scsi(4,RS1,BP,rskernel,"/sd0/boot_local/rs1.cmd")
wait_boot_ack(RS1)

SV1 = 0xd2000000
svkernel="/sd0/sub_systems/sv/bsp/qp/vxWorks"
load_scsi(5,SV1,BP,svkernel,"/sd0/boot_local/sv1.cmd")
wait_boot_ack(0)

# after I recompiled the boot image for this card, it takes forever to boot
# that is why I moved the boot_ack down here
wait_no_buserr(FD1)
wait_boot_ack(FD1)
value = 0 = 0x0
```

c. The bootline command for the Big-Disk mode is listed in the following paragraphs:

```
# backplane network address
BP = 0x04000600

# Wait for slow cards to get going.
AP1 = 0x10000000
wait_no_buserr(AP1)
wait_boot_ack(AP1)

RE1 = 0x70000000
wait_no_buserr(RE1)
wait_boot_ack(RE1)

FD1 = 0x20000000

SX1 = 0xd0000000
sxkernel="/sd0/sub_systems/sx/bsp/vxWorks"
load_scsi(2,SX1,BP,sxkernel,"/sd0/boot_local/sx1.cmd")
wait_boot_ack(SX1)

# after I recompiled the boot image for this card, it takes forever to boot
# that is why I moved the boot_ack down here
wait_no_buserr(FD1)
wait_boot_ack(FD1)
value = 0 = 0x0
```

A.3.1 BOOT CONFIGURATION

```
VxWorks Boot]: @

'.' = clear field;  '-' = go to previous field;  ^D = quit
```

boot device : scsi=0,0

processor number : 0

host name :

file name : /sd0/bsp/mv167/vxWorks.nfssrv.sm32

inet on ethernet (e) : 128.183.95.68:ffff0000

inet on backplane (b) : 128.183.95.69

host inet (h) :

gateway inet (g) :

user (u) : vxd

ftp password (pw) (blank = use rsh):

flags (f) : 0x28

target name (tn) : vxetshi2

startup script (s) : /sd0/boot_local/etsh.cmd

other (o) : ei

A.3.2 PROBLEMS THAT MAY OCCUR

A.3.2.1 Problem 1

The following problem upon booting the system indicates an error. This may occur due to an invalid path for the startup script.

eths.cmd.(lzp or bigdisk) : No such file or directory

Unable to open startup script **/sd0/boot_local/etsh.cmd**

A.3.2.2 Solution 1

At the prompt type **bootChange** to change the boot configuration. Press **Return** until the following is displayed:

startup script (s) : **/sd0/boot_local/etsh.cmd** if boot from a local disc.

Verify the correct path name. If it is incorrect, change it and reboot the system.

A.3.2.3 Problem 2

The following problem upon booting the system indicates an error.

Attaching network interface ln0...done

```
Attaching network interface lo0...done
Loading...
Error loading file: errno = 0x3d
Can't load boot file!

[VxWorks Boot]:
```

A.3.2.4 Solution 2

At the prompt type **c** to change the boot configuration. Press **Return** until the following is displayed:

file name : **/sd0/bsp/mv167/vxWorks.local** if boot from a local disc.

Verify the correct path name and then reboot the ETS HRS system.

APPENDIX B
NETWORK TEST TOOLS

B.1 INTRODUCTION

This section describes tools that can be used to test the capabilities of the ETS HRS in the absence of the external entities to which it must be tested.

B.1.1 CDS FDDI Connection

This is used as the receiving end of the data set transfers from the ETS VHS system. In the absence of EBnet interface, the data sets from the Ciprico are sent via FTP from the rack to the FDDI interface on the CDS. However it should be noted that the performance rates cannot be tested.

B.1.2 CDS Ethernet Connection

This is used as the sending end of the data set transfers to the ETS VHS. In the absence of the EBnet interface, the data sets are sent to the Ciprico via FTP using the Ethernet interface on the rack. Thsi is used purely to test the requirement that the Ciprico can receive and store data sets.

B.1.3 ETS TRS to ETS VHS Connection

This is used to test the output of the CADU serial stream from the SONY tape drive. The data stream is fed in to the Frame Synchronizer card, and the Reed-Solomon card to verify the data rate and quality.